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**Posttraumatic Stress Disorder:
A Cognitive Model of
the Mechanisms of Intrusive Memories**

*“.....the question of whether the brain is able to “take pictures,”
and whether some smells, images, sounds, or physical sensations
may be etched onto the mind....., still remains to be answered.”*

___Bessel A. van der Kolk (1996, p. 297)

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ABSTRACT

Immediately after a traumatic event, almost all people suffer from intrusive thoughts about what took place (McFarlane, 1992). In addition, trauma victims can experience intrusive brief sensory fragments of the trauma, irritability, mood swings, and (emotional) numbing—all of which are a normal part of the recovery process (Ehlers & Clark, 2000). Within three months of the trauma, many victims recover, however, in a significant subgroup of victims, trauma symptoms can persist for years (APA, 2000; Ehlers & Clark, 2000). In this subgroup of trauma victims who receive the diagnosis PTSD, clear and vivid memories of the traumatic event regularly intrude into consciousness with an immediate sensory and emotional intensity that gives the victims the feeling that the traumatic event is happening over again, and at this very moment in time and place (Ehlers & Clark, 2000). The core problem in posttraumatic stress disorder (PTSD) is that the memory of the trauma is not integrated and accepted as being part of the trauma victim's own personal past (van der Kolk, 1996). Instead the trauma memory comes to exist separately from other ordinary autobiographical (personal) memories. This paper has been done independently, in an effort to answer the following questions regarding the re-experiencing symptoms of PTSD: Where is the memory storage system for trauma autobiographical memories? Is it the same memory storage system that contains ordinary (non-trauma) autobiographical memories? How do the memory system(s) involved in intrusive memories operate to enhance and /or inhibit their retrieval? How can the PTSD phenomena of “flashbacks” and “affect without recollection” be explained? Are the contents of flashbacks meaningful? If so, in what way? Finally: How and why does dissociation sometimes occur in trauma victims? In light of these questions, two relevant cognitive-behavioral theories will be presented and analyzed: (1) a “*cognitive model of PTSD*” (Ehlers & Clark, 2000), which suggests that PTSD becomes persistent in trauma victims who have negative appraisals of the event and are unable to re-tell what happened during the event in a coherent way, due to a disturbance in autobiographical memory; and (2) “*dual representation theory*” (Brewin, Dalgleish, & Joseph, 1996), which suggests that there exists two separate, and distinct memory storage systems, one which contains ordinary autobiographical memories, and another which contains trauma autobiographical memories. Additionally, I propose in this paper, a 2-system memory theory of how the mechanisms of intrusive memory might work. The model is consistent with the main clinical features of PTSD, draws on some of the previous research contributions of other authors,

and attempts to answer the research questions which I have presented. The theory suggests that within the implicit memory system as we know it, there exists a secondary implicit memory system called, “body memory” (e.g., van der Kolk, 1994), which has a minimal amount of conscious awareness, and operates mainly subconsciously to encode, store and *play-back* many of the re-experiencing symptoms of PTSD.

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CHAPTER 1: INTRODUCTION

It has been nearly 30 years since Posttraumatic stress disorder (PTSD) was officially introduced into the diagnostic manuals (APA, 1980). PTSD is a common reaction in the immediate aftermath of a traumatic event (Ehlers & Clark, 2000). The most common categories of traumatic events that lead to a diagnosis of PTSD include rape, violent assault, military combat, natural disasters, accidental disasters (e.g., plane crash), and man-made disasters (e.g., war-time bombing, & terrorism). Many victims of such traumas automatically recover within three months of the event, but in a significant subgroup of sufferers, the symptoms become chronic after three months, often persisting for years (Ehlers & Clark, 2000; APA, 2000). In North America, PTSD persists throughout the lifetime of 8% of those diagnosed with it, while in at least another 50% of PTSD sufferers, it lasts for one year (Davidson et. al., 1996).

According to the American Psychiatric Association's DSM- IV and DSM-TR (2000) manuals, (PTSD) is partly defined as the diagnosis given to a person who has either experienced, witnessed, or was confronted with an event which involved either: (a) actual or threatened death; (b) serious injury; or (c) a threat to one's own physical integrity or that of another. In addition, the trauma sufferer must have necessarily responded to such a situation with a feeling of either intense fear, helplessness, or horror. This partial definition highlights the fact that should a victim of trauma be “lucky” enough to have escaped the throws of death, the threat posed by the experiences of the trauma to the person's own integrity, and the subsequent fear, helplessness, or horror that ensued, is sufficient to consider that individual a candidate for PTSD. Exemplifying this threat to integrity, is a threat reliably associated with the highest risk of development of PTSD _ rape, which is a threat to an individual's physical integrity (Brewin, 2004).

At the same time, victims of PTSD can suffer a variety of symptoms, these include: difficulty in either falling or staying asleep, irritability, concentration problems, hypervigilance, and a pronounced startle response (APA, 2000). However, perhaps the most frightening and distressing core symptom of PTSD is involuntary or intrusive memories /or re-experiencing symptoms (different terms for the same core symptoms) (Ehlers, Hackmann & Michael, 2004). They refer to the experience that people with PTSD have when they come into contact with specific reminders of the original trauma. They report a re-experiencing of spontaneous, repetitive, and unwanted memories of some of the aspects of the trauma which emerge into the conscious mind, leading trauma victims to subsequently react with distress (Ehlers, Hackmann & Michael, 2004). The intrusive memories rarely appear as thoughts, but can appear in all sense modalities: sight, sound, taste, touch, and smell (Ehlers & Steil, 1995; van der Kolk & Fisler, 1995). Also reported are re-

experiences of bodily sensations, motor responses, as well as physical and physiological reactions (Ehlers, Hackmann & Michael, 2004; Ehlers & Clark, 2000).

However, without question, the most common mode of expression of intrusive memories are as fragments of sensory impressions, mainly in the form of visual images (Ehlers & Steil, 1995; Ehlers, Hackmann, Steil, Clohessy, Wenninger & Winter, 2002; Ehlers & Clark, 2000). In addition, in many cases these visual images are particularly clear and vivid, and are accompanied by a spontaneous reliving of specific moments of the traumatic event including the “original” emotional responses together with the perception that the trauma is happening all over again “right here” (in the present location) and “right now” (at this very moment in time). (Ehlers & Clark, 2000; Hellowell & Brewin, 2000a,b). Therefore, this particular form of spontaneous reliving carries with it an inherent misperception / distortion of the correct time and place in which the original trauma occurred. This particular form of spontaneous and unintentional re-experiencing has been termed a “flashback memory” by Hellowell and Brewin (2002). Other researchers (e.g., Ehlers & Clark, 2000; Foa & Rothbaum, 1998), however, have called it a “hotspot” (i.e., a distressing moment having the most emotional impact) in cases where the same vivid re-experiencing symptoms appear as a trauma victim attempts to *intentionally* recall a traumatic event (as opposed to re-experiencing that occurs *unintentionally*, as in the flashback). An interesting aspect of both the *flashback* and the *hotspot*, is that when the re-experiencing of either one is underway, trauma victims are unable to access their own memory to gain any post-trauma information they have learned that could either correct or update any misperceptions /distortions the victims arrived at or experienced during the original trauma; these misperceptions are still contained within the flashbacks and hotspots, but memory of them is blocked from being corrected (Ehlers, Hackmann, & Michael, 2004).

Dissociation is another phenomenon that frequently occurs in conjunction with trauma and indeed interferes with recovery from PTSD (Clark & Ehlers, 2005). It refers to a way of organizing information from a (traumatic personal) experience into compartments where aspects of the trauma are not integrated into one whole unified experience (van der Kolk, 1996, p.306). Although it has been proposed that dissociation experienced during a trauma provides the explanation for the fragmentation of memory (Spiegel, 1991; van der Kolk & Fisler, 1995), our knowledge of trauma, still to date, lacks a better understanding of the processes by which dissociation works (Clark & Ehlers, 2005).

The purpose of this paper is to describe some of the main clinical features of trauma memories widely observed and reported in posttraumatic stress disorder. Special attention will be given to a discussion of intrusive memories in the form of *flashbacks*, *hotspots*. Additionally, the phenomenon of, *affect without recollection* (see Schacter, Norman, & Koutstaal, 1997) in which trauma victims

re-experience emotions or physiological sensations associated with the trauma, but without remembering that the trauma ever took place_will be thoroughly outlined and discussed in this paper . These aforementioned three key features of victims' reactions to trauma, will be presented in conjunction with a discussion of the role that explicit and implicit memory, and neuropsychological structures, such as the hippocampus and the amygdala, may play in the development and expression of PTSD symptoms. Dissociation in its three known forms will be reviewed and discussed in light of the PTSD manifestations of *flashbacks* and *affect without recollection*.

Two current cognitive-behavioral theories deemed relevant in my attempt in this paper to answer the questions of how the mechanisms of intrusive memories work namely, *cognitive model of PTSD* (Ehlers & Clark, 2000) and *dual representation theory* (Brewin, Dalgleish, & Joseph, 1996) will also be presented and the strengths and weaknesses of each theory will be discussed

Finally, like Brewin, Dalgleish, and Joseph (1996), I will attempt to propose a 2-system memory theory of how the mechanisms of intrusive memories might work. The theory I put forward is based on the clinical observations and research contributions of the two authors previously mentioned, whose two theories I present. Additionally, the contents of my theory have equally been inspired and influenced by the important work of other authors, such as: Ehlers and Steil (1995); Ehlers, Hackmann, Steil, Clohessy, Wenninger, and Winter (2002); Foa and Rothbaum (1998); van der Kolk and van der Hart (1996); van der Kolk and Fisler (1995); Conway and Pleydell-Pearce (2000); LeDoux, Iwata, Cicchetti, and Reis (1988); Loftus and Loftus (1980); Ademas (1991); Squire and Zola-Morgan (1991); and Sapolsky (2003).

The 2-system memory theory I put forward is an attempt to answer the following questions about intrusive memories: Where is the memory storage system for trauma autobiographical memories which are fragmented, disorganized, and break into consciousness unwanted as intrusive memories? Is it the same storage system that contains ordinary (non-trauma) autobiographical memories which are intact and which we can voluntarily retrieve? How do the memory system(s) involved in intrusive memories operate to enhance and /or inhibit the retrieval of intrusive memories? How can the phenomena of *flashbacks*, *hotspots*, and *affect without recollection* be explained? Are the contents of flashbacks meaningful ? If so, in what way? Finally: How and why does dissociation sometimes occur in trauma victims? Clinical case examples will be presented and analyzed in this paper in an attempt to answer these intriguing questions. It is hoped that the proposals the paper offers will stimulate further investigations into possibly uncharted areas of thinking about the symptoms of PTSD.

CHAPTER 2: THE TWO MAIN MEMORY SYSTEMS: EXPLICIT VERSUS IMPLICIT MEMORY

2.1 Explicit Memory

Explicit memory (also referred to as, *declarative memory* or *conscious memory*) is believed to work in conjunction with three main structures in the brain: the hippocampus, the medial temporal lobe and the cerebral cortex (Evans, 2003). It is believed to be the memory storage system of facts and events of “*what happened*” and information in it can be consciously (i.e., intentionally) remembered or recalled. There are believed to be two kinds of explicit memory: *episodic memory*, and *semantic memory* (Atkinson et al., 2000). Episodic memory contains facts about personal episodes or events that have taken place in our lives (e.g., buying your first car). Memorable events such as these are often encoded into episodic memory with both the specific time and place of the event's occurrence. A further subtype of episodic memory is *autobiographical memory*, which contains details of events that have happened to us privately /personally. Finally, the second and last kind of episodic memory known as, semantic memory, involves knowledge about objects (e.g., what a comb is and what it is used for) as well as knowledge about pure facts (e.g., the sun is a star) (Andrewes, 2001).

When an autobiographical memory enters consciousness, it contains both specific information about the event and context information (Ehlers, Hackmann & Michael, 2004). Processing carried out in the explicit memory storage system of autobiographical memories, is improved by an analysis of the meaningful content (semantic understanding) of a word (e.g., is this word a plant, or animal ?) of the memory rather than using strategies of association comparisons to cue recall of the memory (e.g., does this word contain the letter “s” in it ?) (Andrewes, 2001).

2.2 Explicit Memory During Trauma

Picture the following scenario if you will: It's 1:00 a.m. in the morning, and you're walking home from a dinner party at your neighbor's house. The night is dark, the streetlights dim, and you're the only person you see out at this time of night. As you walk down the sidewalk towards your home, you suddenly catch a glimpse of the movement of something ahead of you. It's the figure of something black emerging from the bushes and onto the same sidewalk as you. You can't make out what the figure is, and because it's so dark, you're unable to see any distinguishing features on the figure that could tell you what it is. The distance between you and “it” is quickly narrowing. Fear kicks in, and your heart begins to race. The fear overtaking your body prompts your mind to make

an immediate decision – “fight or flight”? The figure in the dark could either be harmless or it could be dangerous, you don't know. Regardless, you're alone, and you don't have much time to decide. What will you do? Will you continue walking down the sidewalk, or will you let your feeling of fear and your instinct to run take over?

Since the purpose of introducing this example is to illustrate how PTSD and its accompanying intrusive memories can occur, let us imagine that you decide to stay on the sidewalk. What develops next is a traumatic incident you will hardly forget, as the figure turns out to be that of a masked individual, carrying a steal rod, who strikes you immediately across your body, a repeated number of times, in an attempt to steal money and jewelry you may have in your possession.

The following is believed to occur neuropsychologically within the body, during a traumatic event. It clearly shows the complex efficiency of the 'machinery' of the body, and the communication that takes place between its warning systems: During a traumatic event, the sensory stimuli from the ongoing trauma enters the central nervous system (CNS) via the sensory organs (e.g., eyes, nose, skin, ears) causing activation of the thalamus. The thalamus passes this sensory information on to the amygdala, which evaluates the stimuli, determines it to be at extremely high levels of arousal, then attaches an appropriate emotional meaning (LeDoux, 1986) to the arousal (e.g., fear, horror, anxiety, helplessness). The thalamus sends this emotionally charged information further on to two other areas of the brain: (1) the brainstem_which responds by releasing high levels of stress hormones, including norepinephrine (NE); the (NE) triggers activation of the nervous system's *fight or flight* and *freezing* (i.e., “playing dead”) behavioral responses (LeDoux, Iwata, Cicchetti & Reis, 1988); and (2) the hippocampus_whose functioning is disrupted by the influx of the high levels of emotional arousal originating from the amygdala (Ademac, 1991; Squire & Zola-Morgan, 1991). The hippocampus is also possibly disrupted by the brainstem's release of the stress hormone, cortisol (Sapolsky, 2003). A possible consequence of such a disruption in the hippocampus, is inhibition of several of its functions which are necessary for explicit (conscious awareness) memory, which are: (1) evaluation, categorization, and integration of incoming sensory input with already existing memory of similar sensory info experienced in the past; and (2) placement of this incoming stimuli into its correct context of time and place (van der Kolk, 1996).

Van der Kolk (1996) raises the question of whether this possibility of a disruption in the hippocampus could explain why PTSD patients retrieve the (explicit) autobiographical memory of the traumatic event as disjointed (i.e., as images, somatic sensations, smells and sounds) rather than as a single, whole event. The assumption being that the disruption in the hippocampus prevents the incoming stimuli from the traumatic event from being integrated into explicit, conscious awareness memory.

I suggest, it can be argued that the highly elevated levels of emotional arousal (especially fear) during a trauma, may inhibit the cerebral cortex of the brain from carrying out three key activities which also require conscious awareness: (1) ability to think; (2) ability to focus attention; and (3) ability to hold concentration and avoid for example, dissociation. Instead, the trauma victim, with a mind and body overwhelmed by fear, and unable to “think straight”, must despite the trauma, try and carry out the necessary physical movements (albeit in a “mechanical way”) necessary to escape the situation.

Based on van der Kolk's (1996) hypothesis that both time and place are likely to be incorrectly perceived when the hippocampus is disrupted, I suggest that victims of trauma who go on to develop PTSD, were unable during the original trauma, to feel a sense of experiencing the ongoing events in “real time”. Instead, I suggest that during a traumatic event, the disruption of the hippocampus, “blocks out” a true sense of how much time actually elapses during the course of a traumatic ordeal. Instead, the focus of attention stays “fixed” on the immediate “here and now” moment, giving the trauma victim a subjective experience of time as being only “now” (i.e., at the present moment in time). Further, I assert that the same disruption of the hippocampus is responsible for the distortion of time which PTSD patients experience during post-trauma “flashbacks”, where patients have a false perception that the original trauma is re-occurring in the here-and-now.

Brewin (2001) noted that during a traumatic event, high levels of arousal are known to decrease a person's ability to pay attention to their surroundings, thereby reducing the amount of sensory information that can be registered about the event. In other words, our natural, automatic ability to *selectively attend* (focus on and inspect the most central stimuli, while ignoring the irrelevant) is restricted during a threatening situation. The possible domination of so many inhibitory mechanisms activated in response to threat, in particular the suggestion of an impaired hippocampus (whose functioning is essential to explicit memory), would provide at least partial explanation as to why victims are unable during many PTSD re-experiencing symptoms, to orientate themselves to the present reality of actual time and place.

On the other hand, I postulate that an additional mechanism, which is activated together with the triggering of a trauma-related cue, also inhibits access to explicit memory. I discuss this mechanism, as well as other possible mechanisms at work in PTSD in my theory of a 2-system memory to be presented later in this paper.

2.3 Implicit Memory

Implicit memory (also called, *non-declarative* or *procedural* memory), are stored memories we have, but which we are unable to call into conscious awareness; despite this, these stored memories do influence our behavior (Alloy et. at., 1996). What we learn and store in implicit memory has usually been learned by associative learning (i.e., learning that one event is linked /associated with another). Therefore, recall of information stored here does not occur by a deliberate and conscious attempt to remember the information, as one would when retrieving from explicit memory. On the contrary, recall from implicit memory happens automatically as it recognizes an appropriate cue (e.g., perceptual reminder) that has previously been associated (in the past) with what is to be recalled now.

Implicit memory is generally accepted to be involved, in particular, in the learning of motor skills (e.g., riding a bike), and cognitive skills (e.g., reading, performing mental math calculations).

An appropriate illustration of how implicit memory functions is found in results of work with amnesiac patients who could neither deliberately remember old facts (i.e., involvement of explicit memory) about their lives, nor were deliberately able to learn new facts. Despite this, these same patients could, exhibited no problems in remembering perceptual and motor skills (intact implicit memory) which they had already learned in the past; additionally, the patients were even able to learn similar types of perceptual-motor skills (Atkinson et al., 2000).

One study carried out regarding the brain's functioning, has indicated that implicit memory carries out its work in many different regions of the brain (Evans, 2003). However, in particular, it appears that damage to the brain's *left* cortical, is associated with an impairment in the *verbal* nature of implicit memory, while *right* cortical damage, is associated with an impairment in *non-verbal* implicit memory (Schacter & Church, 1992).

2.4 Implicit Memory During Trauma

It was Janet (1919, 1925) who first observed that intense levels of arousal, during periods of high stress, such trauma, appear to impair proper functioning of explicit memory. This impairment, in turn, reduces the ability to access to our autobiographical memories. Janet further described the “speechless terror” or loss of words that can occur with victims' shock and horror of what they experienced during a trauma. A state of speechless horror that often in the aftermath of the trauma, diminishes the victims' ability to retell a complete, detailed, and organized story of exactly what happened.

Though perhaps verbally incapable of explaining the events that took place during the trauma, Janet (1909, 1919, 1925) asserted that victims of trauma, nonetheless, retain an *awareness* of the *perceptions* and *feelings* they experienced in connection with the original trauma. Janet proposed that the intense arousal the victims experience leads to a splitting off (i.e., dissociation) / retrograde amnesia for memory of the trauma as a whole unit of experience. The 'complete' experience of the trauma is split off from the conscious mind (i.e., explicit memory). What remains instead, within the victim's memory, says Janet, are the accompanying sensory perceptions and feelings from the trauma.

CHAPTER 3: A REVIEW OF DISSOCIATION

The American Psychiatric Association (1994) defines dissociation as a disruption of the usually integrated functions of consciousness, memory, identity or perception of the environment. In defining dissociation, other authors have emphasized its other aspects, such as Meichenbaum (1994) who aptly describes the phenomenon of dissociation as the ability to “forget” in order to “survive”; and van der Kolk (1996) who refers to dissociation as a way of organizing information from experience by compartmentalizing it. That dissociation should have a place at all, in the discussion of PTSD was recognized in some clinical observations from years gone by (e.g., Jung, 1921-1922; McDougall, 1926; Myers, 1940). These clinicians asserted that the critical issue in posttraumatic stress is psychological dissociation. Slightly more recent studies of a variety of different types of trauma populations which include, survivors of oil rig disasters (Holen, 1993), earthquakes (Cardena and Spiegel, 1993), fires (Koopman, Classen & Spiegel, 1994), combat (Bremer et al., 1992), and refugees of war (Carlson & Rosser-Hogan, 1991), have likewise continued to show that dissociation during trauma is a significant predictor of the development of PTSD post-trauma (van der Kolk, 1996, p.314).

An understanding of how dissociation has come to be associated with posttraumatic stress is offered by Lazarus (1996) who says that in general, people can attempt to cope with a highly stressful or traumatic situation in one of two ways: (1) either by gathering together whatever resources one has in order to tackle and solve the problem; or (2) by easing the emotional tension that the threat arouses, by altering either one’s internal perception, one’s consciousness or one’s attitude. In situations where resisting an assault in an active way could provoke retaliation from the perpetrator, such as in the case of childhood sexual abuse, rape, or political torture, rather than putting up a fight, a trauma victim can alternatively escape the trauma by merely altering his /her consciousness through “dissociation” (van der Kolk, 1996, pp.304-305).

Van der Kolk (1996, pp.306-319) summarizes our most recent understanding of the phenomena of dissociation and its three forms beginning with the first form, “primary” dissociation. It is the form characteristically seen in PTSD and manifests itself in the form of repetitive and unwanted intrusive trauma memories, accompanied by vivid visual re-experiencing symptoms of the trauma such as nightmares, and flashbacks. Many people when confronted with a threat which they (subjectively) experience as too overwhelming, are unable to integrate the totality of such a dramatic experience into their conscious mind. Instead, some of the sensory and emotional aspects of the event remain isolated from the conscious experience and do not become integrated into one personal (autobiographical), coherent experience (van der Kolk & Fisler, 1995). In re-experiencing symptoms, seemingly neutral (i.e., harmless) stimuli, can trigger a PTSD patient to experience the

dissociated parts of the trauma all over again, as if they the original trauma were re-occurring again (e.g, Kardiner, 1941).

“Secondary” dissociation, which in recent years has also been termed, “peritraumatic dissociation” (Marmar et al.1994b), is the form of dissociation that occurs during the midst of a trauma victim's experience of the traumatic event. Peritraumatic dissociation functions as a way of allowing the trauma victims to distance themselves emotionally and psychologically from the full impact of the ongoing horrific events of the trauma. Peritraumatic dissociation accomplishes this by essentially blocking the trauma victim's *awareness* of the reality of their traumatic experience, so as to limit the victim's pain and distress (van der Kolk, 1996, pp.313-316) . Individuals that have been traumatized by experiences such as incest, traffic accidents and combat, often describe *mentally* leaving their bodies at the moment of the trauma to stand at a distance instead, and merely observe as a spectator what happens (Gelinas, 1983; Noyes, Hoenck, & Kupperman, 1977). Noting a somewhat more positive aspect of peritraumatic dissociation, Meichenbaum (1994) suggests it can be viewed as a useful “auto-hypnotic” skill, that provides a defense against trauma, fear, and anxiety, by keeping painful events of the trauma out of awareness and memory, and in doing so “safeguard” the integrity of a person's personality.

Finally, “tertiary” dissociation involves the containment of traumatic experiences in separate states of consciousness (van der Kolk, 1996, p.308). It is the form of dissociation commonly reported by traumatized individuals who have been subjected to years of intense sexual, physical, and psychological abuse from early childhood (Putnam et al., 1986). As a result, their minds have dealt with the trauma by employing mechanisms of coping that involve the development of new, additional personality identities, in an effort to contain the trauma in separate *ego states* (van der kolk, 1996, pp.317-318). Tertiary dissociation allows a traumatized person to keep his own existing “self”/personality, while at the same time having separate, additional personality identities which process the traumatic event__this frees the person to continue their everyday life with little interference from trauma memories (van der Kolk, 1996, pp.317-318). An example of tertiary dissociation is, “*dissociative identity disorder*” (formerly known as “multiple personality disorder”) where fragmentation of the trauma is split into multiple personality identities, some of which have the awareness of different aspects of of what occurred during the trauma, while other personality identities within the same individual, remain unaware of the horrible and unbearable experience of the trauma (van der Kolk, 1996, p.308).

CHAPTER 4: RELEVANT COGNITIVE-BEHAVIORAL THEORIES

4.1 A Cognitive Model of PTSD (Ehlers & Clark, 2000)

One cognitive-behavioral model of PTSD that has contributed much to the understanding of the disorder is that of Ehlers and Clark (2000). Further details and expansions of the model are also found in Ehlers, Hackmann, Steil, Clohessy and Wenninger (1999), and Ehlers, Hackmann and Michael (2004). A brief summary of the major assertions of this model will now be presented with a discussion of its strengths and weaknesses. In addition, some of the proposals which I put forth as I analyze the theory, may in some cases, provide reasonable, alternative explanations for some of the phenomena experienced in PTSD as well as answer some of the still unanswered questions regarding it.

In their *cognitive model of persistent PTSD*, Ehlers and Clark (2000), and also Ehlers, Hackmann and Michael (2004) suggest that individuals differ in the personal meaning which the experience of a traumatic event has for them. The model proposes that victims of trauma who go on to develop persistent (i.e., chronic) PTSD, do so because of the presence of two factors. The combination of two factors produces within the victim an (ongoing) “sense (perception) of current threat,” which makes the individual less likely to recover quickly from the trauma, these two factors are: (1) the victim has excessively negative (cognitive) appraisals of the trauma in that they are *unable* to see the trauma as a horrible experience that took place at one particular point in time, and does not necessarily have any threatening implications for their personal future; and (2) the victim's memories of the traumatic event lack the characteristics of other ordinary autobiographical memories; this means that when these individuals either intentionally recall traumatic memories, or re- experience them in intrusive ways (e.g., flashbacks) that: (a) the events appear in separate, disjointed /fragmented pieces that are poorly organized as they are distorted in both time and place, giving the false perception that the trauma is reoccurring in “the here and now”(i.e., sense of current threat); (b) this lack of sufficient integration of the trauma memory into ordinary autobiographical memory leads to an inability of PTSD patients to fully retell a coherent story of what happened during the trauma, which in turn, contributes to the maintenance of involuntary triggering of trauma-related cues, since the inhibitory effect that retelling the trauma has on the triggering of cues is lost; (c) the memories cause emotional distress; (d) the memories can be easily triggered by exposure of the victim to trauma-related cues that are either external (e.g., a voice bearing resemblance to one heard during the trauma) or internal (e.g., an emotional feeling or a physiological reaction similar to one experienced during the trauma); (e) the intrusive memories (e.g., flashbacks) display strong sensory impressions (e.g., vivid images), and strong motor components (e.g. physiological /somatic reactions); (f) the intrusive memories are seldom in the

form of *thoughts*; (g) victims are usually unaware of which stimuli act as triggers for trauma intrusions, instead they seem to happen out of the blue; (h) there is either confusion or an inability to access trauma details; (i) there is confusion or an inability to remember the correct order of how the sequence of events unfolded, with gaps in recalled material; (j) there appears to be an inability to access information discovered post-trauma that could correct or update mistaken impressions or mistaken predictions victims might have made during the traumatic event; (k) victims can sometimes experience physiological sensations or emotions associated with the trauma without being able to remember the traumatic event itself called, *affect without recollection* (see Schacter, Norman, & Koutstall, 1997); and (l) the emotions accompanying the intrusive memories feel the same as those experienced during the original trauma.

The following are among some of the examples of excessively negative appraisals which Ehlers and Clark (2000) have noted that people with PTSD have: “nowhere is safe”; “the next disaster will strike soon”; “I attract disaster”; “others can see that I am a victim”; “I deserve that bad things happen to me”; and “I cannot cope with stress.” According to Ehlers and Clark, these negative appraisals if present, only serve to maintain PTSD in that they directly produce negative emotions (e.g., anxiety, anger, depression), and set into motion a variety of dysfunctional responses both cognitively (e.g., the victim avoids thinking about the event), and behaviorally (e.g., the victim exhibits *safety behaviors*, such as constantly checking the rear view mirror to prevent the occurrence of another car accident). Such cognitive and behavioral responses are meant by trauma victims to reduce both their ongoing perception of threat, and their feeling of distress. However, in the long-term, these types of responses prevent trauma victims from making changes in their way of thinking about the trauma, so that the end result is actually a maintenance of persistent PTSD rather than a reduction or extinction of it, explain Ehlers and Clark.

It is worth noting that the emphasis which Ehlers and Clark (2000) place on the role of appraisals in the development of persistent PTSD, appear to have been influenced by the *cognitive appraisal models* of two previous authors, Janoff-Bulman (1985) and Epstein (1990). It is likely that both these authors would define Ehlers and Clark's usage of the construct, *appraisals* as: the basic assumptions and beliefs that all individuals make about themselves and about the world. The implication from the models of both Janoff-Bulman (1985) and Epstein (1990) is that these assumptions and beliefs are seldom seriously questioned on a deeper level of reflection until for example, the occurrence of a traumatic event. The subsequent effect of the trauma on the victim has the potential to either disrupt or shatter (i.e., invalidate) these basic beliefs, and PTSD reflects the victim's maladaptive coping responses when these beliefs are shattered /invalidated. Janoff-Bulman (1985) postulates the existence of three basic assumptions that most PTSD sufferers have made

about themselves and the world: (1) the belief in one's own personal invulnerability; (2) the perception of the world as meaningful and comprehensible (i.e., able to be understood); and (3) viewing oneself in a positive light. Similarly, (Epstein 1990) argues there are three most fundamental beliefs which all individuals have: (1) the view of the world as benevolent (i.e., caring), and as a source of joy; (2) the view of the world as meaningful, comprehensible, predictable, controllable, and just; and (3) the view of oneself as worthy (e.g., lovable, good, and competent).

In the work of Ehlers and Clark's (2000), one cannot help but notice that the concept of appraisal is used synonymously with the notion of a *personal meaning*. For instance, the authors explain that the negative appraisal, “nowhere is safe,” represents an example of one of a variety of personal meanings individuals suffering from persistent PTSD are likely to have as a result of their traumatic ordeal. While Ehlers and Clark emphasize that people who have *persistent PTSD* differ in the personal meanings which they assign to their traumatic experience, I propose that *all* victims of trauma, *with or without* PTSD, differ in the personal meanings which they attach to the traumatic events they experience. However, those trauma victims that are at particular risk of developing PTSD, I suggest are those whose personal meaning revolve around a very *specific* personal meaning, one which I term, *the realization of life and death*. Furthermore, in line with Ehlers et. al. (2002), I propose that this meaning arises when the victim experiences a particular incident during the trauma that causes *the most emotional distress*. However, I suggest that this emotionally distressful incident coincides simultaneously with the trauma victim's experience of one /or more of the following three occurrences : (1) first realizes that his /her own life, or the life of another is in imminent danger; *and /or* (2) witnesses the actual death of another person during the trauma, or catches a glimpse of the body of a person who died during the trauma; *and /or* (3) the trauma victim feels responsible /”to blame” for the death of another person that occurred during the trauma. One highly significant clinical finding that seems to validate my proposal is the discovery that rape victims who either experienced physical injury during their assault, or cognitively appraised the situation as a *threat to life*, were nearly three times more likely to develop PTSD than rape victims who did neither (Kilpatrick et al., 1989).

I would like to present, and then analyze the following case example in the light of my own hypothesis about the vital role the effect of the specific personal meaning, *realization of life or death*, may play in the development of PTSD. The case example, which is from the work of Reemtsma (1997), is presented here, slightly shortened, though otherwise as it appears in Ehlers and Clark (2000):

Case Example: “His [the patient's] most distressing intrusion after his release from the cellar was a

knocking sound, and he experienced great distress with this intrusion. His kidnappers had knocked at the door of the cellar when bringing food, water, etc. When they knocked, he had to lie down immediately with his face to the floor and make sure he did not see them, knowing he would be killed if he did. He describes that initially the intrusive knocking sound appeared to come out of the blue, but that he gradually became aware that this intrusion was often triggered by hearing footsteps. During his captivity, he had heard footsteps approaching before the kidnappers knocked at the door..."

Analysis: The patient's main intrusion was hearing a knocking sound. The knocking sound was the last sensory stimulus that was emotionally tolerable for the patient to encode into memory. It immediately precedes a "specific incident" that for the patient, elicited the most emotional distress for him during the entire trauma. The specific incident for this patient, was the moment that he realized that his imprisonment was *a matter of life or death*, and this was the moment he understood that he would be killed if he failed to immediately place his face down to the floor after the footsteps of his kidnappers stopped, and the final sound of the dreaded knock on the door came.

I therefore, suggest that one of the weaknesses of the Ehlers and Clark model is their view of negative appraisals as a primary contributor to the development of persistent PTSD. I, on the other hand, view these negative appraisals as secondary in PTSD development, as they were formed as *after thoughts* during the *aftermath* of the trauma. As a result, they conceivably have less distressing emotional impact compared to that of the personal meaning of the realization of life or death, which I suggest elicits more intense emotion, and in addition, arises during a specific highly distressing incident *during* the trauma (rather than after it), which I propose leaves behind a stronger memory tract.

I find some degree of similarity of my viewpoint in the work of Peterson, Prout & Schwarz (1991) who suggest that the degree to which an individual's assumptions and beliefs are threatened, will influence that person's ability to cognitively process a traumatic event. One resulting effect may be that the greater the breakdown of these basic beliefs, the more susceptible the trauma victim will be to (memory) intrusions and (emotional) numbing, due to an inability to assimilate the trauma information (Peterson, Prout & Schwarz, 1991). I suggest that it is the assignment of one personal meaning in particular_ that of the realization of life and death, which can arise *during* an ongoing trauma (as opposed to after), that seriously challenges the trauma victims' basic assumptions and beliefs about themselves and the world. In challenging a trauma victim's assumptions, the personal meaning which the realization of life or death brings, disrupts the victim's beliefs to the degree that the person is left so psychologically weakened by the impact of the realization, that he /she is unable to maintain conscious control over the assimilation /integration of the trauma information.

The resulting effect on the trauma victim is a high vulnerability to the re-experiencing symptoms of PTSD in the form for example, of memory intrusions (e.g., flashbacks, affect without recollection).

Ehlers and Clark (2000) also suggest in their model that the two factors, negative appraisals and the lack of ordinary autobiographical memory traits within trauma memory, are themselves influenced by the type of cognitive processing of trauma information used by the trauma victim during the trauma. They propose that those trauma victims likely to develop persistent PTSD are those who, during the midst of a trauma, use “data-driven processing” also referred to as, *cue-driven* (i.e., the processing of *sensory impressions*). During trauma, these victims' thinking is confused, they are overwhelmed by the sensory impressions of the trauma, and are unable to process the trauma's *meaning* in an organized way by putting it into its correct context of time and place. This will result in the following: (1) strong “perceptual priming”(a form of implicit memory) that allows faster recognition of even *harmless* cues that bear similarity to stimuli already experienced previously during the original trauma; this results in triggering of involuntary intrusive memories; (2) poor autobiographical quality of trauma memory; and (3) reduced ability to voluntarily retrieve trauma memories. On the other hand, Ehlers and Clark suggest that those trauma victims unlikely to develop PTSD are those who during a traumatic event, use “conceptual processing” (i.e., processing of the meaning of the trauma situation in an organized way, putting it into context in time and place). These victims' thinking is very clear, and they are able to maintain the ability to analyze the traumatic situation.

The two distinctive forms of processing appear to present a clear strength for the Ehlers and Clark (2000) model, as they are consistent with the clinical reports and descriptions of trauma victims, with or without, persistent PTSD. At the same time, there is a weak side to this hypothesis in that it offers no explanation as to *which* mechanisms, perhaps even of a biological nature, may be potentially responsible for both enhancing and reducing the triggering of trauma-related cues, as well as enhancing and reducing the retrieval of the trauma memories themselves. It appears that responsibility for whether or not a trauma victim manages to process the horrific details of a trauma, is largely dependent upon the person's ability to think clearly “under pressure”, despite the intense psychological, emotional, and physical toll the trauma might take on the individual. In addition, the model seems to lay an equal amount of responsibility for the development of PTSD upon the trauma victim's choice of exclusively negative appraisals when thinking about the traumatic event.

I, on the contrary, suggest that, among other things: (1) another form of memory, known as “body memory” in the literature (e.g., van der Kolk, 1994) is partly responsible for the triggering of cues; and (2) brain structures such as the amygdala and hypothalamus, and arousal levels and hormones, play a major role in the inhibition of normal cognitive processes such as thinking and memory

encoding. A full presentation and discussion of these mechanisms can be found in my theory on body memory later in this paper (see Chapters 5 and 6). It is fair to say, however, that Ehlers and Clark do acknowledge the probability that both cognitive and biological pathways may be affected by the impact of the high levels of arousal and fear victims experience during a trauma, and that high levels of the hormone, cortisol, may disrupt trauma encoding (Ehlers & Clark, 2000; Newcomer et. al., 1999).

One of the strengths of the model is the addition of the *warning signal hypothesis* (Ehlers, Hackmann, Steil, Clohessy, Wenninger & Winter, 2002). It is an attempt to explain the stimuli that appear in the content of intrusive memories (e.g., flashbacks, affect without recollection). The authors hypothesize that these stimuli are not *random* but, that they instead serve a function. The stimuli either signal the *onset* of the trauma itself, or signal the onset of the *most emotionally distressing moments* of the trauma i.e., had the *largest emotional impact* on the trauma victim. Such emotionally distressing moments experienced post-trauma during intentional recall of trauma memories are termed , “hotspots” (e.g., Foa & Rothbaum, 1998) In either case, the stimuli mainly appear to either signal the *moment* when the *meaning* of the trauma *changed for the worse*, or signal the moment when something which happened, gave the situation a *more traumatic* personal meaning for the victim than before. The stimuli are called warning signals because, in the future, if they are encountered again, they would be recognized from a distance and avoided. Their mere presence would indicate *impending danger*, which happens also to be the factor that creates in trauma victims the perception of current threat they feel when experiencing intrusive memories. Common cues that act as warning signal stimuli post-trauma are physical cues (e.g., smells, a pattern of light), emotional states (e.g., feeling of helplessness or being trapped), or internal cues (e.g., a touch on a certain part of the body).

4.2 Dual Representation Theory (Brewin, Dalgleish & Joseph, 1996)

In an attempt to explain some of the features of PTSD, a model has been advanced that takes into account both biological and psychological knowledge, by offering a cognitive science perspective on how PTSD may function. Presented by Brewin, Dalgleish, and Joseph (1996), *dual representation theory*, in addition, proposes that there are two separate and distinct types of

autobiographical memories, and that each of the two types represent two separate memory systems that store all autobiographical memories. Each storage system has its own way of encoding, organizing, and retrieving the traumatic memories which it stores.

According to Brewin et.al., (1996), the first of the two memory storage systems is called, “*situationally accessible memory*” (SAM). It is the memory system that contains encoded, intact *fear memories* (i.e., trauma autobiographical memories). This includes spontaneous, intrusive images of the traumatic event, such as “flashbacks”, and “hotspots” (moments during the trauma that create the greatest emotional distress during recall), which Brewin et. al. terms, *critical retrieval cues*. As its preferred way of remembering what took place during a trauma, the (SAM) system uses primarily visual-spatial, and sensory encoding of trauma-related stimuli (as opposed to verbal). For example, (SAM) encodes the more perceptually detailed and emotionally charged components of trauma memories such as sights, sounds, smells, and the trauma victim's own emotional responses (e.g., helplessness). However, because encoding is non-verbal and (SAM) material has undergone little conscious processing, the (SAM) memories are difficult to communicate (e.g., in the form of storytelling) to other people, which are unlike ordinary autobiographical memories (which have had sufficient conscious processing and are encoded verbally). The (SAM) memory system also uses *association* as its method of learning what is to be remembered – a feature which makes its stored fear /trauma memories vulnerable to being triggered by trauma-related stimuli that is associated with one another, and that act as cues.

Brewin et. al.'s (1996) dual representation theory has a distinct advantage over Ehlers and Clark's (2000) cognitive model of PTSD. Instead,of contrasting trauma victims by those who have the ability to process a traumatic event in an organized way by registering the meaning of the trauma (i.e., conceptual processing) compared to those trauma victims overwhelmed by the events, and thus only process the trauma's sensory impressions, dual representation theory offers an alternative explanation that suggests that mechanisms within the body that are neuropsychological and biological in origin. These mechanisms are designed to activate during a threatening situation, and enhance and inhibit registration of trauma stimuli. I share this latter cognitive science view with regard to many of the re-experiencing symptoms of PTSD, and I espouse my views later in this paper (see Chapter 6).

Brewin et. al.,(1996) notes that the brain structure, the hippocampus, which is essential in explicit

memory, appears to be specialized in learning how to place ordinary autobiographical memories into their correct context of both time and place (Kesner, 1998). However, (SAM) memory works independently of the hippocampus, making the (SAM) system unable to distinguish between whether or not its stored fear memories are from times present or times past. As a result, argues, Brewin et. al., trauma victims respond to the re-experiencing of intrusive trauma memories (e.g., flashbacks), as though they present an immediate /current threat.

I support Brewin et al.'s (1996) view regarding the vital role the hippocampus plays in the functioning of conscious awareness (i.e., explicit memory), as neuropsychological research bears this out (Squire & Zola-Morgan, 1991). Additionally, the hippocampus is believed to have an especially important function in holding a piece of incoming information to be remembered for a few seconds in short-term memory, before this information is either forgotten, or passed on to long-term memory storage (van der Kolk, 1996, p.231). Dual representation theory is therefore strengthened by these findings. On the other hand, I suggest an alternative view_ which is that the hippocampus holds the original trauma information in short-term memory just long enough for the body memory to make a replica /copy /recording of *some* of this information, after which the body memory stores this replica in subconscious long-term memory storage. This would imply that intrusive trauma memories, or (SAM) memories would have some small degree of conscious awareness as a result of having been handled by the hippocampus during the few seconds of transfer from short-term memory to long-term memory. At the same time, the content of these intrusive memories (e.g., context of time and place) would be extremely resistant to change, as the intrusive memories, (and all their content material) are virtually *unalterable* replicas /copied recordings of the original trauma.

In Brewin et al.'s (1996) description of flashbacks, one can see that many of the features of a flashback directly reflect many of the key attributes of the (SAM) memory system. A flashback, as described by Brewin et. al., is a very perceptual form of memory that appears spontaneously, and is therefore, under very little conscious control, _ a factor which also explains why flashbacks cannot be deliberately /consciously retrieved. The flashbacks are non-verbal entities, and because they feel as though they are being re-experienced right *here* (in this location), and-right *now* (at this present time), they have no correct placement in time or place. Such features do not characterize ordinary, non-trauma autobiographical memories, which are classified as residing in explicit memory. Brewin

et al., however, wishes to guard against the urge to call flashbacks a form of implicit memory, as there exists some ability for flashback sufferers to consciously recall some parts of their traumatic ordeal. Instead, flashbacks seem to behave as a self-contained form of memory that is image-based, non-hippocampus dependent, and does not necessarily interact with ordinary autobiographical memory (Brewin et. al., 1996).

I, on contrary, have postulated that intrusive memories, such as flashbacks, are the body memory's replicas /copies of some of the original trauma information, which were later placed in subconscious long-terms memory storage. The way in which a possible body memory functions in its “recording” of trauma information, together with my suggestion that the body memory stores this recorded information subconsciously, leads me to hypothesize that flashbacks, or (SAM) memories *are* a form of implicit memory. Furthermore, flashbacks do behave in a self-contained manner, because being a form of implicit memory, as I propose, they are theoretically independent of explicit memory, as well as unchangeable units of *recorded* original trauma information (see Chapter 6: 6.2).

The second memory storage system in Brewin et. al.'s (1996) dual representation theory is called, “*visually accessible memory*” (VAM). It is the memory system that contains ordinary (i.e., non-trauma) autobiographical memories, as well as cognitive appraisals (e.g., including personal meanings) regarding them. (VAM) also uses a verbal, meaning-based method of encoding (analyzing the meaningful content of words), and is a form of (conscious) explicit memory which is believed to be dependent upon working in conjunction with the hippocampus. Cooperation between the two, bring about the ability to connect pieces of an autobiographical event together into one coherent, and integrated whole (Eichenbaum, 1997), as well as locate these events in their correct time, place and context. It has also been suggested that the hippocampus is the brain structure that is associated with memories of *conscious* experience (Moscovitch, 1995).

The ordinary autobiographical memories stored in the (VAM) system, have therefore undergone sufficient amounts of conscious processing that not only allow them to be transferred to long-term memory, but also allow them to be transferred in a form that can be deliberately and consciously retrieved, reflected upon, and verbally retold as a coherent story to others.

Backed by its consistency with neuropsychological research, the proposal that perhaps stands

strongest within dual representation theory, is its hypothesis that PTSD symptoms reflect a breakdown in the mechanisms that are designed to normally block /inhibit: (1) spontaneous, intrusive trauma memories (e.g., flashbacks and hotspot moments of intense emotional distress) from being unintentionally retrieved from memory; as well as (2) normally block all manner of irrelevant information from entering the conscious mind. During a traumatic autobiographical experience, relevant information about the stimuli signaling / warning of a threat, are sent from the sense organs, and as they reach the amygdala (in the limbic system), they quickly activate defensive responses (e.g., Armony & LeDoux, 1997; LeDoux, 1998; LeDoux, Iwata, Cicchetti & Reis, 1988). Defensive responses which function in this way: (1) release of cortisol under such high levels of stress; (2) the cortisol then impairs proper functioning of the hippocampus (see also Metcalfe & Jacobs, 1998); (3) an impaired hippocampus, in turn, results in (VAM) trauma memories showing some degree of disorganization, incompleteness, and loss of quality in content; and (4) the high levels of stress and stress hormones activate the sympathetic nervous system, and its behavioral defenses of “*fight /flight*” and “freezing” (“playing dead”). Furthermore, high levels of such arousal are known to disrupt attention span, limiting the amount of incoming stimuli information that can be encoded during trauma (Brewin, 2001). My presentation of a body memory theory of intrusive memories later in this paper, incorporates many of these findings.

Amid this series of activations to the threat, Brewin et. al. (1996) notes that according to LeDoux et al. (1988) and Benoit et al. (1999), the fear response is actually extinguished if the threat occurs in a situation that is familiar, and is associated with a sense of safety. In such a context, the pre-frontal cortex, working in conjunction with the hippocampus, block /inhibit activation of the amygdala. However, in unfamiliar situations that are either associated with no safety cues, or with threat, on the contrary, no inhibition of the amygdala takes place. Instead, the amygdala is allowed to initiate the remaining activations of stress-related hormonal and behavioral responses. Dual representation theory proposes that in this latter situation (a context of threat), if a large number of fear /trauma memories remain in the (SAM) memory system, these fear memories will be vulnerable to being re-activated / triggered by the presence of trauma-related cues, and result in the individual re-experiencing spontaneous, intrusive trauma memories.

Dual representation theory proposes that the key to recovery from the re-experiencing symptoms of PTSD, is for the trauma victim to create *new* reconstructions of the traumatic event, based on the

relevant features of “old” trauma memories existing in (SAM) memory. Repeated and deliberate focusing of attention on the hotspot moments (of most emotional distress) of these (SAM) trauma memories, allows the pre-frontal cortex to re-encode the images and events into new reconstructions which subsequently are transferred into the ordinary autobiographical, conscious memory system of (VAM). The intention say Brewin et. al. (1996), is that the next time the victim is confronted with a trauma-related cue, triggering of the cue will prompt a competition between the old (SAM) trauma memories and the new (VAM) trauma reconstructions, for retrieval of their trauma information into consciousness. It is intended that the (VAM) reconstructions win the battle, but to do this, their sensory content must be similar enough to the old (SAM) trauma memories, but with the addition of a new element of change to the trauma that takes away the past danger that still gives the victim a sense of current threat today. An example of such a change would be: an adult PTSD victim of childhood sexual abuse could, during therapy, visualize the hotspot trauma moments (of most emotional distress) and add a new element that rids the childhood trauma of its danger, by imagining their adult self intervening in the trauma to prevent any harm from occurring. A win for the (VAM) (explicit memory) trauma reconstructions would mean that: (1) because of the removal of danger from the hotspot moment of trauma, none of the new reconstructed content of the (VAM) trauma memory would be able to evoke a sense of current threat; and (2) as a result, the amygdala would remain permanently inhibited (by the control of a properly functioning hippocampus), from initiating its stress-related hormonal and behavioral responses. The trauma victim would then cease to experience any further re-experiencing symptoms of PTSD, such as flashbacks.

Brewin et.al.'s (1996) proposal that trauma victims can combat and even extinguish the re-experiencing symptoms of PTSD by creating new reconstructions of the old, original trauma memories, is yet another strength of the dual representation theory. Methods such as this have already been demonstrated to be effective, as the standard treatment for PTSD patients usually involves some form of detailed and repeated exposure to the traumatic information and /or *cognitive* modification of the victim's beliefs (or appraisals, or personal meanings) related to the trauma (Foa & Meadows, 1997). Also shown effective, has been the patient's re-living of the traumatic event in the presence of a therapist, and putting words to this experience (e.g., Foa & Rothbaum, 1998).

Clinical findings show that the encoding method which explicit memory employs to process

ordinary autobiographical memories_ that of understanding the meaning of the event through re-telling a narrative (i.e., story) of exactly what happened, also inhibits the triggering of trauma-related cues when trauma autobiographical memories are re-told /elaborated (Conway & Pleydell-Pearce, 2000; Markowitsch, 1995).

CHAPTER 5: A NEW THEORETICAL MODEL OF PTSD: A BODY MEMORY THEORY OF INTRUSIVE MEMORIES

Trauma memories, like all other autobiographical memories, are classified as a form of explicit memory (Brewin, 2001). Theoretically, this means that the facts and events of trauma memories are consciously available to the mind (Eichenbaum, 1997; Squire, 1994), and likewise, retrieval of the information is under conscious control. Inhibitory mechanisms (e.g., hippocampus, pre-frontal cortex) work in conjunction with explicit memory to prohibit entry of unwanted information into consciousness (Bjork, 1989; Brewin & Andrews, 1998; Johnson, 1994). However, in individuals with PTSD, some of the horrific events of the trauma autobiographical memory appear unwanted and involuntarily into consciousness. When triggered by either external cues (e.g., smells, sounds, tastes) (Ehlers & Steil, 1995) or by internal cues (e.g., physiological sensations, emotions) (Ehlers & Clark, 2000), the events of the trauma are experienced mainly as vivid and clear sensory impressions (e.g., flashbacks). Although primarily expressed in a visual-perceptual mode, the impressions and sensations re-experienced can encompass all five modalities (Ehlers & Steil, 1995; van der Kolk & Fisler, 1995).

A number of efforts have been made to explain why events of a trauma memory already stored in explicit memory can, nonetheless, manage to avoid inhibition by the hippocampus, “break-free” of the control of the individual, and appear unwanted in the person's consciousness. Therefore, other memory systems have been advanced to explain the phenomenon. For example, Tulving and Schacter (1990) proposed that some of the phenomena which occur in implicit memory, seem to involve a separate “perceptual representation system” that recognizes perceptual objects, that is independent of autobiographical and semantic memory, and that has no conscious awareness of previous experience. Other theorists, such as Brown and Kulik (1977) hypothesized the existence of a non-verbal, imaginal memory system that produces long-term memories of events that stand out as significant, such as the death of America's President Kennedy in 1963. On the other hand, Pillemer (1998) argued for a dual memory system consisting of a verbal memory under conscious control, and a second imaginal memory system that is present from birth, and operates only automatically. As discussed in depth earlier in this paper, Brewin (2001) postulates a “dual representation memory system” that contains one memory system for trauma autobiographical memories which encodes predominantly visual-spatial processing of stimuli (the storage system for intrusive memories e.g., flashbacks), and another second, and separate memory system for ordinary, non-trauma, autobiographical memories which encodes primarily for verbal processing of stimuli.

I propose that implicit memory is a dual memory system that is comprised of the implicit memory

system as we know it, but additionally, a second memory system called, “body memory”, which I suggest operates predominantly in a form that is subconscious, non-verbal, and visual-somatosensory. I suggest that it also has a minimal degree of conscious awareness. The concept of the possibility of a body memory is not a new one. It has been postulated by, among others, van der Kolk (1994). However, no comprehensive model of how a body memory would function currently exists. In the next chapter of this paper, I attempt to put forward such a theory by asserting that the purpose of a body memory is to encode some of the sensory components of autobiographical events that are associated with high and intense levels of negative, emotional arousal, such as those experienced during traumatic personal experiences.

During an ongoing traumatic event, the body memory appears “selective” in the choice of sensory mode it will encode in. The most predominate stimuli selected for this type of encoding are sensory impressions, especially in the visual-perceptual mode. However, encoding involving all five sense modalities occur as well as the encoding of other sensations, such as emotional and physiological reactions. The dominance of sensory stimuli, in particular, visual but, also other sensations, such as sounds and smells, are commonly reported by PTSD patients (Ehlers & Steil, 1995; Ehlers, Hackmann, Steil, Clohessy, Wenninger & Winter, 2002). That implicit memory (such as the proposed body memory), in some way, plays a key role in the re-experiencing of trauma memories, is echoed in Van der Kolk (1996, p.287) who reports that observations of traumatized populations suggest that trauma memories may have no verbal (i.e., explicit) component to them at all. Furthermore, neuro-imagery studies of the brains of PTSD patients being subjected to clinical provocation of traumatic memories, show that the area of the brain largely responsible for converting subjective experience into speech (Broca's area), decreases its activity, at the same time that the brain's right hemisphere, believed to process intense emotions and visual images, shows an increase in activity (Rauch et al., in press, 1996).

Once sensory encoding from the event has taken place, the body memory stores this sensory information as having originated from the original trauma. This would be consistent with Ehlers, Hackmann and Michael's (2004) description of PTSD patients' emotional experience of flashbacks as a reliving of all the *same* emotions as the ones they experienced during the “original” trauma. I further suggest, that in addition, the body memory simultaneously stores information specifying: (1) the level of arousal (e.g., high, low, or moderate) associated with (i.e., attached to) each stimulus encoded; and (2) the specific emotion (e.g., horror, helplessness) associated with the particular arousal levels. With regard to trauma memories, van der Kolk (1996, p.284) similarly notes that emotions and sensations appear to be the critical cues for retrieving information along associative pathways.

This encoded sensory information, together with its associated arousal and affective states (as experienced during the original trauma), will provide the framework for recognition of similar stimuli during perceptual priming (increased ability to identify objects due to prior experience). Perceptual priming will enable the body memory to quickly and easily recognize either external stimuli in the environment (e.g., sights, sounds) or internal stimuli within the person (e.g., emotions, physiological reactions) as trauma-related reminders when compared to the original trauma stimuli and associations encoded by the body memory. I postulate that in future encounters, the body memory will automatically respond to these trauma-related reminders (i.e., cues) by triggering in particular, two forms of re-experiencing symptom: (1) a flashback; and (2) “affect without recollection” (see Schacter, Norman, & Koutstaal, 1997), which is the phenomenon (termed by Ehlers & Clark, 2000) in which trauma victims sometimes re-experience emotions associated with stimuli from the trauma, yet are unable to remember the trauma itself. Both of these two re-experiencing symptoms will be discussed separately and in greater detail later in the paper (see Chapter 6: 6.2 and 6.2.1) .

The two body memory processes of encoding and cue recognition presented here, mirror Ehlers and Clark's (2000) suggestion that triggering of the re-experiencing symptoms from a trauma (e.g., flashbacks, intrusive memories), involve the memory processes of both perceptual priming for stimuli that occurs during the traumatic event, and strong associative affective connections (through classical conditioning) between these stimuli. Priming and association together increase the probability of a cue-driven, automatic retrieval of trauma memory (Clark & Ehlers, 2005). However, unlike Ehlers and Clark, who assume that the base of operation for the two processes lie in ordinary implicit memory, I propose that the base of operation lies within the existence of a secondary, supportive memory system within implicit memory__ the body memory.

The notion that trauma stimuli have their own associated arousal levels (i.e., high and intense), and specific emotions associated with these arousal levels, is to a great extent, in line with the research findings of LeDoux (1992). According to LeDoux, the amygdala attaches to any given incoming stimulus, the amount of emotional significance it is to have. It then passes this “high-emotional arousal” information on to the hippocampus, as well as to specific areas of the brainstem. The high levels of arousal which this stimulus information represents, provokes several reactions, including the release of stress hormones and the activation of the sympathetic nervous system's “fight/flight” and “freezing” (i.e., to “playing dead”) responses. In addition, other research (Squire & Zola-Morgan, 1991) indicates that high levels of emotional arousal disrupt the proper functioning of the hippocampus, which is necessary for explicit (conscious awareness) memory.

I propose that encoding of trauma stimuli by the body memory occurs simultaneously as the explicit

(conscious awareness) memory system attempts to encode as much as possible of the facts and events occurring during the trauma. Although in the process, there will be some “overlap” (i.e., repeat) of some of the information encoded, I suggest that the body memory is, nonetheless, independent of the explicit memory system. The existence of overlap of much of the same trauma-related sensory information appears evident in PTSD patients. For instance, one form of cognitive therapy for PTSD, “Imaginal Reliving”, requires the patient to intentionally recall (a conscious effort requiring explicit memory) vivid images from the traumatic event. If a body memory system exists, it would contain the vivid images from the trauma, and a range of other sensory impressions, along with the emotions attached to the experience of these stimuli. Assuming that body memory operates mainly subconsciously and yet independently of explicit (conscious awareness) memory, the ability to nonetheless intentionally recall contents of the body memory (a task requiring explicit memory) during therapy, would imply that some of the contents of body memory would have overlap in the explicit memory system. Studies confirm that Imaginal Reliving therapy is especially effective in eliciting all components of the trauma memory, including emotions and sensory impressions (Ehlers & Clark, 2005; Ehlers & Clark, 2000).

Surely questions will arise regarding the necessity of having a second memory system within the implicit memory system. After all, the explicit memory system appears to function very well without one, unless one wishes to hypothesize whether conscious awareness could be a secondary memory system for explicit memory. Such a question could stimulate inquiry into the topic of dual memory in the future. In the meantime, I suggest that the intended use of a body memory within implicit memory, would be to function as a “back-up”, support memory system to record sensory information from life-threatening events. Such a back-up system could be needed in order to ensure that encoded associations made between the body memory and trauma-related external (e.g., smells, tastes) and internal cues (emotions, physical reactions) are not lost. These associations would instead be stored on a long-term basis by the body. In future situations perceived by the body memory as potentially life-threatening, triggering of trauma-related cues by the body memory's recognition of the cues' similarity to the replicas, would provide an automatic, and natural forewarning to keep at a distance from the threat in order to increase ability to survive both physically as well as psychologically.

CHAPTER 6: THE MECHANISMS OF BODY MEMORY FUNCTIONING

6.1 How Body Memory Functions During Trauma

During a traumatic event, once the amygdala evaluates the situation and determines an appropriate arousal level and specific emotion(s) for the stimuli involved, stress hormones are released (LeDoux, 1986). The two factors together appear to disrupt proper functioning of the hippocampus (which is essential to explicit memory performance) in (Ademac, 1991; Squire & Zola-Morgan, 1991; Sapolsky, 2003), while at the same time, the fight or flight response is activated (LeDoux, Iwata, Cicchetti & Reis, 1988). I have suggested that these conditions also disrupt parts of the cerebral cortex that control ability to think, focus attention, and hold concentration (to avoid dissociation during trauma). Additionally, a traumatic event underway is likely to allow no time for a victim to either understand or make sense of the amount and intensity of sensory information emanating from the trauma. Faced with the high probability of disruptions in the hippocampus and cerebral cortex, it is conceivable that little information from the bombardment of incoming stimuli from the trauma is actually being transferred to, encoded into, and processed by the explicit memory system, which currently is considered to be the storage facility for all autobiographical memories. Since the contents of explicit memory consist of knowledge, facts, concepts and their interrelationships (Tulving, 1972, 1983), this necessarily implies that the transference, encoding, processing and storage of such information with respect to the trauma, are unlikely to be found *intact* within explicit memory if its key support structure, the hippocampus, is disrupted during this time.

It has been hypothesized that it is dissociation during trauma which explains why trauma memories (presumed to be stored in explicit memory) are not intact i.e., fragmented (Spiegel, 1991; van der Kolk & Fisler, 1995). On the contrary, I propose that even before the possible occurrence of dissociation during trauma, it is the culmination of the series of disruptive events explained above, that initiates the fragmentation of trauma memory, and that any subsequent dissociation adds to, and helps to maintain the fragmentation problem in PTSD victims. In addition, I suggest that the disruptions account for why clinical observations reveal that PTSD sufferers experience: (1) difficulty in intentionally retrieving a trauma memory that is intact, (2) memory of the trauma is poorly organized, (3) details of the trauma may be missing, (4) confusion about the order in which the events in the trauma occur (Foa & Riggs, 1993; Foa, Molnar & Cashman, 1995; van der Kolk & Fisler, 1995; Koss, Figueredo, Bell, Tharan & Tromp, 1996; Amir, Stafford, Freshman & Foa, 1998), and (5) difficulty in constructing a verbal narrative / story of the events of the trauma that is in its correct context of time and place, and that is also integrated with other autobiographical memories (Siegel, 1995; Ehlers & Clark, 2000).

Furthermore, I propose that at the very moment when these disruptions meet and overlap with one another, it triggers a simultaneous activation of what I suggest is the implicit memory's back-up, support memory system, the body memory. The body memory, in turn, begins the immediate encoding of mainly visual-somatosensory aspects of the incoming trauma stimuli. Similarly, Piaget (1962) argues that when memories cannot be integrated on a semantic (i.e., knowledge of facts, concepts) / linguistic level of processing, the memories instead have a tendency to be organized on more primitive levels of information processing (such as visual images or somatic sensations) (van der Kolk, 1996, p.289). Additionally, in a study of trauma memories conducted by van der Kolk and Fisler (1995), all trauma victims questioned, reported that they initially after the trauma, were unable to tell a story about what happened, regardless of whether they actually knew (i.e., was consciously aware) that the trauma had occurred. All the victims, instead, claimed that the memories of what happened came only in the form of somatosensory flashback experiences, with no linguistic components whatsoever, and therefore seemed to serve no communicative purpose. The victims reported that it was only when more sensory modalities were activated by the continued flashbacks, that they were gradually able to use the sensory fragments to piece together a verbal story of what had happened during the trauma.

I propose that once activated, the body memory (a mainly subconscious system independent of explicit memory) immediately begins its task of not simply encoding, but more precisely, “imprinting” an exact copy or “replica” of some of the non-verbal, sensory components of traumatic events. Part of the purpose in having a body memory which has a subconscious, long-term memory store which houses these imprinted replicas of trauma-related sensory information, is to ensure that this information will be in a location resistant to change or extinction. The major task of a body memory is therefore similar to that of Loftus & Loftus's (1980) “*video-recorder model*” of autobiographical memory. Their model supposes that the brain acts as a video camera that *records* its perceptions of ongoing autobiographical events; after which the recordings are stored in permanent long-term memory but, can, in the meantime be retrieved as *copies* of these past events.

Clinicians who have worked with a variety of traumatized patients have reported that these patients consistently describe their perception of trauma memories as being *exact* representations of sensations that occurred at the time of the trauma (van der Kolk, 1996, p.287). Furthermore, Van der Kolk and van der Hart (1991) suggest that intrusive memories in general are resistant to change. In addition, van der Kolk (1996, p.297) raises the question of whether the explanation might lie in the possibility that the brain may have the ability to “take pictures” and “etch” onto the mind some sensory impressions unable to be changed by the passage of time. Indeed, trauma victims claim that

their re-experiencing sensations which have continued to return years and sometimes decades after the original trauma passed, are just as vivid as when the original trauma first took place (van der Kolk & Fisler, 1995).

I assert that the body memory, operating subconsciously, imprints exact copies of certain sensory impressions especially those from the visual-somatosensory mode. However, body memory also imprints exact copies from a variety of sense modalities that were activated under high-arousal during the trauma including sounds, smells, taste, hearing, touch, emotions, bodily sensations, feedback from physical and physiological reactions. These sensations have been widely reported by PTSD patients during moments of re-experiencing (Ehlers & Steil, 1995; van der Kolk & Fisler, 1998; Ehlers, Hackmann & Michael, 2004; Ehlers & Clark, 2000). At the same time, it has been consistently observed clinically that the sensory impressions represented in intrusive memories are seldom reported by PTSD patients to be *thoughts* (Ehlers & Steil, 1995; Ehlers, Hackmann, Steil, Clohessy, Wenninger & Winter, 2002; Hackmann, Ehlers, Speckens & Clark, in press, 2004). Despite, this observation, I suggest that the body memory is capable of imprinting one particular form of (conscious) *thought /cognition* which if it is so, would appear to lend support to my hypothesis that body memory has a minimal amount of conscious awareness (a notable characteristic of explicit memory). This particular form of thought /cognition is what Ehlers, Hackmann and Michael (2004) refer to as an *impression or prediction* (prediction can also refer to: a “felt sense” of what might happen). At the time of the original trauma, the trauma victim reacts to those particular moments during the trauma which they experience as the most intensely distressful, by forming an evaluative impression or prediction either about what has just happened, or about what could happen (Ehlers, Hackmann & Michael, 2004).

Post-trauma clinical observation has shown that PTSD patient-therapist reflections and investigations of the accuracy of these impressions and predictions frequently find they are in need of either updating or correction. Ehlers et al. (2004) have observed that after a traumatic event has passed, when PTSD patients *intentionally* recall “hotspots” (i.e., moments with the most distressing emotional impact) of the trauma, the impressions or predictions appear as part of the content of the hotspots, and are highly resistant to being updated or corrected post-trauma. I suggest that the resistance to change which hotspot-related impressions and predictions exhibit, is due to the imprinting function of the body memory. The hotspot and its entire contents (impressions and predictions included) represent moments that occurred during the trauma that elicited high levels of negative arousal, while having the most distressing emotional impact upon the trauma victim. I suggest that the original frightening moments during the trauma (which the hotspots are merely a

post-trauma “copy” of), have already been imprinted as exact replicas in the body memory's long-term memory storage. Therefore, the source /origin of the hotspots, are the imprinted replicas themselves. Since the replicas reside in the body memory's subconscious, long-term memory storage, this makes the imprinted trauma replicas hidden from conscious awareness while, at the same time, they are highly resistant to change or extinction. The same attributes are true for hotspots, which are mere copies of the imprinted replicas of the original trauma.

As the frightening events of the trauma continue to unfold, trauma victims can naturally feel an intense desire to escape the situation. At the same time, there is an awareness that a successful escape whether by taking “flight” physically (i.e., running away) or by staying and “fighting” one's way out of the situation, is a highly unlikely outcome. It is reasonable to assume that when the events in the trauma reach threshold levels for intensity of negative arousal, and for the *depth of meaning* the situation has for the individual, the trauma victim will no longer feel able to tolerate, neither emotionally nor psychologically, being able to remain consciously aware of the horrific events taking place. I suggest this dilemma marks the turning point, where those trauma victims who will go on to develop PTSD, will at this very moment, experience a spontaneous *primary dissociation*. In effect, primary dissociation, spoken of earlier in this paper as being associated with PTSD, enables the individual to take flight “mentally”, and therefore distance him/herself from being able to be totally aware of the events occurring during the trauma.

According to Van der Kolk (1996, p.6) the critical factor that determines whether or not an event can be said to be traumatic, is the *subjective meaning* that the victims themselves attach to the events they experience. Indeed, the amount of subjective distress trauma victims feel, as a result of having endured the trauma, is correlated with later development of PTSD (Laufer, Brett & Gallops, 1985; Feinstein & Dolan, 1991; Perry, Difede, Musngi, Frances & Jacobsberg, 1992).

6.2 How Body Memory Functions Post-Trauma During “Flashbacks”

I propose that in the aftermath of a traumatic event, the body memory is in a state of continued hypervigilance. A somewhat similar belief about hypervigilance was echoed by Abram Kardiner (1941) who in his treatment of traumatized U.S. war veterans, described them as suffering from what he called, “traumatic neuroses” in which the patients stayed in a state of chronic physiological

overarousal with their attention remaining on guard for sources of potential threat (van der Kolk, 1996, p.305). In the case of body memory, I suggest that alongside its state of hypervigilance, it is also equipped with imprinted replicas of the original: sensations, arousal levels, emotional states, and hotspot-related impressions and perceptions, and stands perceptually primed and ready to employ the associative learning capabilities of its 'dual partner', implicit memory, in the automatic (subconscious) recognition of certain trauma-related stimuli/ cues. The cues may either be external (e.g., have a physical resemblance to a stimulus already seen during the original trauma and therefore already primed to be associated with a body memory replica) or the cues may be internal (e.g., elicit a similar physiological reaction as one already felt during the trauma and primed to be associated with a body memory replica). In other words, the body memory uses its storage of previously imprinted replicas of sensory information about the original trauma, in order to recognize *current* trauma cues. I suggest that it is a process that occurs automatically, subconsciously, and independent of explicit memory.

While in continuous hypervigilance post-trauma, I propose that the body memory also maintains its replica information in continuous activation, using it to scan the environment for certain potential cues. Once the body memory recognizes a particular cue as being trauma-related, an interaction occurs between the activated replica information contained within the body memory and the cue. This interaction sparks two responses: (1) the triggering of a (dissociative) flashback; and (2) the simultaneous inhibition of access to explicit, conscious memory, (believed to be the storehouse of autobiographical knowledge and events).

Similar to the dissociation that befalls a significant number of PTSD patients *during* a traumatic event, a flashback is a dissociation (Ehlers, Hackmann & Michael, 2004) however, it occurs *post-trauma*. Findings from several longitudinal studies of road traffic accidents (RTA), and survivors of crimes of assault, have shown that the occurrence of dissociation either *during* a traumatic event or *right after* it, predicts the subsequent onset of PTSD (Ehlers, Mayou, & Bryant, 1998; Halligan et al., 2003; Rosario, Ehlers, Williams, & Glucksman, 2004; Murray et al., 2002; Shalev, Peri, Canetti, & Schreiber, 1996). As described in the introduction of this paper flashbacks appear spontaneously and unwanted in the consciousness of trauma victims. The flashbacks show: exceptionally clear and vivid visual images of specific moments from the original trauma in the form of fragmented sensory impressions, also show a re-experiencing of some of the emotions from the original trauma,

as well as giving the perception that the trauma is reoccurring again in the “here-and-now” (Ehlers & Clark, 2000; Hellowell & Brewin, 2000a,b; van der Kolk, 1996, p.185).

As previously mentioned, some trauma researchers have made a distinction between the term “flashback (memory),” and the similar term, “hotspot.” This distinction has been made on the basis of trauma victim's experience that a flashback occurs *unintentionally* and unexpectedly, while a hotspot occurs as a result of an attempt by the trauma victim to *intentionally* recall some of the details of the trauma. Despite the distinction, the findings from the clinical observations of Ehlers, Hackmann and Michael (2004) suggest that hotspot periods of intense distress and the spontaneous intrusive re-experiencing symptom of the flashback, are closely linked. This linkage lies in the clinical observation that as a PTSD patient tries to intentionally recall a trauma memory in order to construct a narrative / story of what took place, at some point during the narrative, the victim usually feels a hotspot moment of intense distress, which necessarily expresses itself in the form of a spontaneous, dissociative flashback, where moments of the trauma are re-lived vividly by the patient right then and there (Ehlers & Clark, 2000; Hellowell & Brewin, 2000a,b).

Holmes and Brewin (2000) noted that even the strongest form of dissociation which is seen in *dissociative identity disorder*, that of *peritraumatic* dissociation, spoken of earlier in this paper, is associated with an increase in spontaneous intrusive memories as well as associated with a disorganization of trauma memory when it is intentionally recalled.

Based on my proposal of a body memory, I suggest that there are three other factors which flashbacks and hotspots share in common : (1) they are both copies of the imprinted replicas of the original trauma; (2) like the imprinted replicas, they also emanate from the body memory's subconscious long-term storage; and (3) the two attributes just mentioned partly explain why flashbacks, hotspots, and the misperceptions (e.g., false perception of time and place, incorrect or outdated impressions / predictions) that accompany them are, as clinical observations have revealed, (Koriat, Goldsmith & Pansky, 2000; Ehlers, Hackmann & Michael, 2004) nearly invulnerable to being either updated or corrected.

As outlined earlier in this paper, Ehlers et al.'s (2002) “warning signal hypothesis” suggests that the fragments of sensory impressions contained within flashbacks and hotspots, mainly represent stimuli that have little *meaningful* association to the events that unfolded during the original trauma.

Instead, the association which stimuli represented within flashbacks and hotspots have to the trauma, is mainly one of having been (physically) present at approximately the same *time* as when the original trauma occurred , and / or having been within the same situational *context* as the original trauma. Therefore, Ehlers et al. (2002) conclude that the stimuli represented within both the flashback and the hotspot, can best be interpreted as warning signals (based on the original trauma) which if encountered again in the future, would signal impending danger.

As mentioned earlier, I propose that once the body memory recognizes a particular cue as being trauma-related, an interaction occurs between the activated replica information contained within the body memory, and the cue. This triggers a dissociative flashback at the same time that mechanisms, presumably located within certain areas of the brain, “block” / inhibit access to explicit, conscious memory. This would explain why during a (spontaneous) flashback whether it occurs alone, or as the result of a hotspot experienced during intentional recall, that in both cases, trauma victims appear unable to access post-trauma information that could update or correct misperceptions that accompany the flashbacks and hotspots. Because the trauma victim is blocked from accessing (conscious) explicit memory, the person appears unable to correct the misperception that a recurrence of the trauma (via the flashback) is taking place in the present moment of the here-and-now. Instead, the trauma victim is prevented from accessing any knowledge (of facts and events) within explicit memory that might indicate that the (autobiographical) flashback is only a memory from the past.

Furthermore, I suggest that once a flashback or hotspot has begun to “play”(i.e., re-experiencing is underway), two factors make the flashback and hotspot more resistant to being extinguished / stopped: (1) the blocking of access to explicit memory (i.e., conscious awareness) reduces the ability of the trauma victim to exert conscious control over the flashback and hotspot; and (2) my suggestion that flashbacks and hotspots are copies of replicas of the original trauma, and that all three phenomena emanate from the body memory's subconscious, long-term memory, which makes both phenomena much less susceptible to the trauma victim's conscious control. Having taken these factors into consideration, it is reasonable to assume that the flashback or hotspot must, of necessity, “play themselves out”, once they have started.

I suggest that as the body memory's activated replica of (original trauma) information interacts with the trauma-related cue, a spontaneous, unintentional flashback is released. As the flashback (which

is a *copy* of the replica of original trauma sensory sensations) plays, it is unable to be stopped by any attempt at conscious control exerted by the trauma victim. Instead, the flashback is “programmed” to play itself out without interruption. A simultaneous inhibition of access to explicit memory, makes the flashback's contents nearly invulnerable to change, including changes that are corrections. The inability to access explicit memory makes the trauma victim incapable of re-orientating him /herself to the reality that the trauma being played out in the flashback is not happening at all right now, but is instead, a mere memory from the past. Unable to affect it, the trauma victim continues to re-experience the flashback, and with extraordinary clarity and vividness, re-experiences what seem to be the same sights, sounds, emotions, high arousal levels etc., as was experienced during the original trauma.

At this point, one may be allowed to ask the question: what is it about the flashback, or its contents that make it so *important* that it necessitates that the flashback “break free” from what I propose are the confines of the body memory's subconscious memory storage, to surface instead, into the conscious realm, and against a person's will ? I suggest that the answer to this question lies in the meaning that the content of the flashback holds for the trauma victim. This notion was first put forward in the *warning signal hypothesis* (Ehlers et. al., 2002). This hypothesis suggests that there is an association between the personal meaning the traumatic event has for the trauma victim, and which particular stimuli seem to appear within intrusive memories, such as flashbacks, which victims re-experience. Ehlers et. al. postulate that these stimuli which appear in flashbacks and other intrusive memories are not random but, instead either signal the onset of the trauma itself, or signal the onset of moments of the trauma that had the largest emotional impact on the trauma victim and may have changed the meaning of the traumatic event for the worse, with the meaning becoming even more traumatic for the victim than before.

I partially support Ehlers et. al.'s (2002) warning signal hypothesis, especially with regard to its emphasis on the possibility that stimuli appearing as content for intrusive memories have the largest emotional impact, and signal the moment when the meaning of the trauma either changed for the worse , or something happened that gave the situation a more traumatic personal meaning. However, I suggest a slightly more expanded and explicit explanation of what this change in meaning may involve. In contrast to Ehlers et. al.'s (2002) assertion that these warning signal stimuli signal the onset of the trauma, I propose instead that these stimuli, more precisely signal the

very last sensory impression (e.g. the last visual image, the last touch) which the trauma victim is able to *emotionally tolerate* encoding of into subconscious body memory. I fully support Ehlers et. al.'s suggestion that stimuli appearing as content for intrusive memories can alternatively (besides signaling the onset of the trauma) signal the onset of the most emotionally distressing moments during the trauma that also had the largest emotional impact on the trauma victim.

Borrowing Ehlers et. al.'s (2002) notion of the 'most distressing moment', I summarize by proposing that that the stimuli contained within intrusive memories, which Ehlers et. al. term, warning signals, are: stimuli that signal the very last sensory impression the trauma victim was able to emotionally tolerate recording into subconscious body memory, and were also the last sensory impression the victim experienced immediately prior to a specific incident during the trauma, which caused the victim the most emotional distress. I further suggest that the specific incident referred to here, is experienced by the trauma victim as the most emotionally distressing because it also bears a very personal meaning, since it marks the moment when the victim either: (1) first realizes that his / her own life, or the life of another, is in imminent danger; *and /or* (2) the trauma victim either witnesses the actual death of another person during the trauma, or catches a glimpse of the body of a person who died during the trauma; *and /or* (3) the trauma victim feels responsible / "to blame" for the death of another person that occurred during the trauma.

I suggest that within the memory of the trauma victim, a *strong association* is created between the stimuli that comprise the *very last sensory impression* the victim was able to encode on an emotional level, and the *personal meaning* that lies within the most emotionally distressing incident that the trauma victim experienced during the trauma. The factor that makes the last sensory stimuli emotionally tolerable is that the timing of its appearance occurs within what I call, the cut-off *boundary of the realm of (emotional) safety*, which is immediately before what is to be experienced by the victim as the most emotionally *intolerable* (i.e., most emotionally distressing) incident of the trauma. These latter two assertions lend support to, and help to explain why Ehlers et. al.'s (2002) warning signal hypothesis seems quite conceivable in its suggestion that the personal meanings connected with the most emotionally distressing incidents that elicit them, (are in essence, responsible for affecting the subconscious mind in such a disturbing way as to) produce the intrusive memories, such as the flashbacks, that trauma victims experience.

Once these flashbacks begin, I suggest that they are necessarily programmed to play out without

interruption, at the same time that inhibition of the trauma victim's ability to access explicit memory (due to high levels of stress impairing the hippocampus), makes the flashbacks' contents immensely resistant to change (e.g., correction, updating).

I further assert that the personal meanings along with the most emotionally distressing incidents which generate them, represent the one form of thought / cognition that the body memory imprints. Assuming this is so, their imprinting into body memory would seem to suggest that body memory has a minimal amount of conscious awareness in that it reflects what the trauma victim “thinks” about his /her experience of the most distressing incident, however much these thoughts / reflections may indeed be encoded or stored on a deeper subconscious level of body memory.

Additionally, I suggest that the meanings along with the most emotionally distressing incidents, represent the equivalent of what Ehlers et. al. (2002) would refer to as “impressions /predictions”, which are the content of hotspots (the phenomena trauma victims experience post-trauma during intentional recall of trauma memories) Thus, like the impressions / predictions within hotspots, the personal meanings along with the most emotionally distressing incidents that generate them, are equally resistant to post-trauma change (e.g., correction or updating).

Ehlers et. al. (2002) have additionally suggested that the (non-random) stimuli that comprise the content of flashbacks and other intrusive memories, and which they term, warning signals, can also sometimes signal the moment *post-trauma* when the victim realizes something worse or more traumatic could have occurred. On the contrary, I assert that these stimuli signal distressful incidents that occur exclusively *during* the traumatic event, rather than after it. On the other hand, I support Ehlers et. al.'s (2002), notion that these warning signal stimuli, which I instead refer to as, the last emotionally tolerable stimuli for encoding, are stimuli that signal the onset of the most emotional distress moments, and carry personal meaning for the trauma victim.

The “life or death” realization, along with the specific incident connected with it, and the emotional distress they produce, combine to give the incident a highly personal meaning for the trauma victim. They infuse the flashback with the emotional and psychological energy it needs to break free from the body memory's subconscious memory storage, to surface instead into the conscious mind of the victim, against the victim's will.

To illustrate some of the characteristics they believe describe the content of intrusive memories and

of intentional recall of trauma memories, Ehlers, Hackmann and Michael (2004) presented several case examples of empirical studies of PTSD patients who summarized their intrusive trauma memories. They have altered some of the details of these case examples to prevent patient identification. Five of these case examples, I have chosen to present as they appear in Ehlers et. al. (2004), although they appear in random order below and, in one or two cases, have been slightly shortened. A sixth and final case is presented from early psychiatric literature—it is a case taken from the French neurologist and a former teacher of Freud, Charcot (1887).

In presenting these case examples in the following paragraphs, I will also analyze them in an effort to demonstrate the possible applicability of my own assertion that the life or death realization, the specific incident connected with it, and the personal meaning bonding the two, comprise the central content of flashbacks, and are the reason why flashbacks appear. If the following demonstration of the applicability of my assertion to the case examples appears to fit consistently as a reasonable explanation for these PTSD cases, it is hoped that the life or death assertion will be subjected to empirical testing with PTSD patients in the near future. The results of further investigation into the assertion may prove fruitful in increasing our knowledge of PTSD, and thereby enable us to be of even greater help to survivors of trauma:

“Case Example 12: A patient appeared to have very coherent memory of a fatal car crash.....His main intrusion was the sound of the crash. When he relived the event in therapy, he retrieved a detail that he had not remembered when thinking about the event before: After the impact (i.e., after the sound), he had seen the other driver collapsed over her steering wheel, realized she was dead, and thought he had killed her (although the accident was not his fault).”

Analysis: The patient's main intrusion was the sound of the crash, because this sound was the last sensory stimulus he experienced as tolerable enough on an emotional level to be recorded in memory and which he experienced immediately before a “specific incident” that elicited the most emotional distress for him during the trauma. The specific incident for this patient was the moment he caught a glimpse of the body of the driver of the other car (involved in the crash), collapsed over her steering wheel. In addition, two other elements add to the distressful impact of this moment: it was also the moment the patient realized that the other driver was dead; and it was the moment he *mistakenly* realized or concluded that it was he himself who was responsible for the woman's death. Thus, the sound of the crash represents more than a simple sound for the patient, it signals that a

specific incident which immediately follows the sound, bears a highly personal meaning for the patient_ mainly, the realization that his situation involved life or death, which he was witness to, and it highlights the burden he bore of mistakenly realizing /concluding that he was to blame for the death that occurred during the trauma. These various cognitions the patient was able to hold in mind indicate that the memory system storing this information (i.e., body memory), has a minimal amount of conscious awareness (explicit memory) and does not simply encode, and store trauma information on a purely non-verbal, sensory level. In addition, these cognitive realizations which are arrived at by the trauma victim, are themselves central to the content of the flashback (i.e., the sound of the crash), and explain why the flashback appears.

Only during a reliving session of treatment guided by the therapist, was the patient, for the first time, able to (intentionally) recall the horrifying full content of the flashback which was: the specific incident that caused the most emotional distress for him (i.e., the glimpse of the body of the other driver slumped over her steering wheel), the life or death realization (i.e., his realization that the other driver was indeed dead), and his mistaken realization / conclusion that he had caused her death. These three cognitive formulations combined to create a deep personal meaning of the specific incident for the patient. The awareness of these meaningful aspects before therapy, was too emotionally intolerable for this patient to bear on a conscious level. Therefore, until he was able to enter an emotionally safe environment where he could participate in a reliving session guided by the therapist, the entire central content of the patient's flashback had to remain hidden beneath the surface of the more superficial, sensory aspect of the flashback (i.e., the sound of the crash), which was the last sensory stimuli that the patient was able to tolerate encoding on an emotional level into subconscious body memory.

“Case Example 8: A man who witnessed the suicide of a person who jumped in front of a train re-experienced the sight of railway tracks as he had seen them before the person jumped. He did not re-experience the sight of the train approaching....”

Analysis: The patient's main intrusion was the sight of the railway tracks. This sight was the last sensory stimulus that was tolerable enough on an emotional level for the patient to experience and encode in memory, occurring just prior to his experience of the incident that elicited the most emotional distress for him during the trauma. This incident which caused the most alarming and distress for him was the moment he witnessed, with his own eyes, the willful jump of a bystander

onto the railway tracks before an oncoming train. This incident now bears a significant personal meaning for the patient, because with the jump, came the startling realization for the patient that he was witnessing the suicidal death of another person. The witnessing of the suicide sends a direct and strong cognitive message regarding life and death that is central to the content of the patient's *railway tracks* flashback, and explains why the flashback appears. On the contrary, the sight of the train approaching does not manifest as a flashback, because the timing of its appearance as a sensory stimulus occurs *after* the patient's realization of what the jump by the bystander signified /represented (i.e., suicide, life or death..). Whereas the *sensory* stimuli that comprise the flashback (i.e.,the railway tracks) make their appearance *immediately before* the jump by the bystander and the patient's subsequent realization that a life or death situation was in progress.

“Case Example 20: A motorbike rider was hit by a car. His main intrusion was of flying through the air. The intrusion was linked to the worst moment, which happened shortly afterwards, when he saw an image of himself in pieces and thought he was dead.”

Analysis: The patient's main intrusion was of flying through the air. It was the last sensory impression that was emotionally tolerable to the process of encoding by the patient's memory, and occurred at a impressionable point during the trauma, i.e., immediately before a specific incident that caused him the most emotional distress_ which was the moment he saw an image of himself in pieces. Deepening the distress for this patient is the close linkage the image of being in pieces has with the his own thought (realization, or belief) that he might also, at that same moment, be dead. The cognitive realization of how close he came to the boundary between life and death, is the personal meaning embedded in the patient's most distressing incident of seeing an image of himself in pieces. The flashback which the patient re-experiences of flying through the air, signals the onset of this life or death realization, which itself can be found within the context of his most emotionally distressing moment.

“Case Example 9: A woman re-experienced a touch on her shoulder. After her accident she had been trapped in her car, but initially did not realize that she was hurt. A paramedic had touched her shoulder and asked whether she was all right. It was following this question that she felt pain and realized that she could be badly hurt.”

Analysis: The patient's main intrusion was a touch on her shoulder. It is interesting to note that the

intrusion excluded the verbal element of the paramedic's question to the patient, a factor which would confirm the notion that flashbacks seldom appear as thoughts, but mainly as sensory stimuli. The touch intrusion immediately preceded what the patient experienced as the most emotionally distressing incident during the trauma, which was the physical sensation of pain and simultaneous realization that she herself could be badly injured (i.e., the life or death realization) as a result of the car accident. The intrusive touch on her shoulder (which is a replica in body memory of the original touch sensation she had experienced during the original trauma when the paramedic touched her), appears as her flashback, as it was the last sensory impression she was able to emotionally tolerate the encoding of into subconscious body memory. It comes just prior to the patient's experience of the more dreadful realization that after being asked if she was okay, she felt pain which then made her realize she may be badly hurt. This creates a situation which instantly has a personal meaning for the patient, making the realization harder for the patient to bear on an emotional level, and as a consequence, it becomes encoded on an even deeper, more subconscious level of body memory compared to the sensory element of the flashback (i.e., the touch on the shoulder).

“Case Example 6: A woman whose daughter died in a house fire while she was out, had frequent horrifying intrusions of seeing the curtains [in the house] burning when she returned. She had assumed when she saw the curtains that her daughter was burning alive. However, she subsequently discovered that the daughter had been upstairs, and had been overcome by fumes [as the cause of death rather than by burning]....She also had intrusions of seeing the body of her daughter in the mortuary, with no signs of burns. Before treatment, she had never connected these two [contradictory flashback] parts of the memory for the traumatic event.”

Analysis: The patient's intrusions were twofold: the main intrusion was the sight of burning house curtains, while an additional intrusion, was the sight of the unburned body of her daughter in a mortuary. In the original trauma, the sensory stimuli of seeing the burning house curtains occurs just seconds before the patient mistakenly assumed that her daughter (who was in the house at the time) was burning alive as the fire swept through.

The high and intense level of negative emotional arousal the mother experienced from the sight of the house curtains burning, combined with her almost immediate, subsequent mistaken (cognitive) assumption that her daughter was in the process of being burned alive, created an automatic and strong association between these two factors. The strong memory trace of this association led to the

generation of the main flashback of seeing burning curtains which the mother frequently re-experiences post-trauma when returning home where the fatal fire occurred. The burning curtains were the last sensory stimulus that the mother was able to tolerate encoding on an emotional level into memory. In this case, there appears to be no specific incident which occurred immediately after (the sight of the burning curtains) that elicited the most emotional distress for the mother. However, it appears that the sight of the burning curtains alone, was enough to cause the most emotional distress for the mother. The reason being it automatically carried with it the realization that the burning house and curtains were a matter of life or death, and carried with it the even deeper personal meaning that the fire meant life or death for her own daughter, who was still inside the house.

As part of the nature of flashbacks, comes the extreme difficulty patients have in the ability to correct or update the flashbacks' contents. Therefore, despite the fact that the mother discovered post-trauma, that her daughter did not burn alive in the fire, but instead died of smoke inhalation, the mother was unable to change her body memory's recorded replica of the original sensory information regarding the curtains and the original, mistaken cognitive assumption that death occurred by fumes. Instead, the corrective information discovered post-trauma, generated an additional, and subsequent flashback for the mother_ that of seeing her daughter unburned in a mortuary. Only through treatment was the mother able to see the contradictory nature of the content of the two flashbacks.

Case Example from Charcot (1887) as described by van der Kolk (1996, p.283): "...Lelog,...was in a traffic accident with a horse-drawn wagon, after which his legs were paralyzed. Although Lelog fell to the ground and was unconscious, there were no neurological signs indicating a somatic cause of the paralysis. Instead, it was discovered that as he fell and just before he lost consciousness, he saw the wheels of the cart approaching him, and strongly believed that he would be run over."

Analysis: Although this case example shows no indication whatsoever that the patient, Lelog suffered from an intrusive memory, such as a flashback, it on the other hand, exemplifies a case for the notion of a body memory. The patient was examined medically and no organic reason could be found for the paralysis he suffered in both legs after the wagon accident. The implication is that Lelog was never actually run over by the wagon. Instead, at the same time that he suffered a fall to the ground during the accident [and presumably suffered no further injuries], he also caught sight of

the approaching wheels of the horse-drawn wagon. This sight was so emotionally overwhelming and the thought of escape nonexistent that the patient strongly believed he would be run over before he immediately afterwards lost consciousness.

The post-trauma the medical exam was proof to Lelog that his leg paralysis had no organic basis, which in turn was also proof that his strong belief that he would be run over by the wagon was indeed mistaken. Despite this medical evidence, Lelog's condition did not improve. Furthermore, the only key that can unlock the “mystery” as to *why* the paralysis remained in Lelog's legs, lies in his *strong belief* that he was more seriously injured than he really was. This belief had a profound effect upon the patient's conscious mind.

After the fall from the wagon, the sight of the wagon's wheels approaching him, struck fear in the patient, unleashing a high and intense level of negative emotional arousal, at the same time that his conscious mind was overcome with the (cognitive) belief (or seeming realization) that more serious injury would surely befall him. This cognition, in conjunction with the intense emotional and hormonal reaction instigated by both the overwhelming fear, and the frightening visual image of the approach of wheels from the horse-drawn wagon, created such an intense and strong memory association between these three factors, that their combined effect on both the mind and the body was to “convince” body and mind that Lelog's emotionally charged conviction that he was seriously injured (though it did not turn out to be true).

As in the case of flashbacks where their central content material (i.e., the personal meaning that a specific emotionally distressing incident has for the trauma victim) is highly resistant to post-trauma change (e.g., correction or updating), so also is it in the case of this patient. However, what deviates in patient, Lelog's case, is the lack of a flashback. The effect, however, has been the same_ the original belief /impression /prediction that arose in Lelog's mind during the trauma, was unable to be changed in any way. This, despite the post-trauma medical knowledge Lelog had gained. The body memory had subconsciously encoded the personal meaning that the frightening sight of the approaching wagon had for Lelog_ namely, the belief that he was about to suffer serious injury. In addition, body memory went a step further by acting upon the patient's prediction of “gloom and doom,” by subsequently “shutting-down” the usage of Lelog's legs in response to the experience of his most emotionally distressing incident (i.e., seeing the wheels of the horse-drawn wagon approach him).

Lellog's paralysis is also an obvious case of the *somatoform disorder*, “conversion disorder”, which in past times was referred to as, *hysteria*. In conversion disorder, the patient does display what appears to be an actual disability. This can manifest itself for example as, the loss / impairment of a motor or a sensory function, which will commonly be expressed in symptoms of either partial, or total : blindness, deafness, paralysis, and loss of sensation (anesthesia) (Turner, Jacob & Morrison, 1985) . However, like the symptoms of another somatoform disorder, “hypochondriasis”, conversion symptoms are not confirmed by closer medical examination to be rooted in any organic reason. Nonetheless, the patient's symptoms are not “faked”. In other words, conversion patients like Lellog are not *willfully* refusing to use parts of their body. Instead, their physical responses are *involuntary*, and are therefore totally outside of the individual's *conscious control*.

In their revolutionary publication, *Studies in Hysteria* (1895), Freud and a colleague, the physician, Josef Breuer, concluded that people develop hysteria (i.e., conversion disorder) because rather than express their grievances, they instead displace these strong, unexpressed emotions onto the body. The body then reacts by producing somatic symptoms. Freud and Breuer went on to hypothesize that in order to reduce these symptoms, these patients must be induced to release the *repressed* grievances and emotions by talking in an uninhibited way under hypnosis, which would then bring the patient's thoughts and memories to consciousness (Alloy, Acocella & Bootzin, 1996).

Freud's former neurologist professor, Charcot (1887), presented the case of patient Lellog eight years before Freud and Breuer reported their experimental findings on hypnosis and the *unconscious*. Had the knowledge been available at that time of the essential role the patient's retelling /elaboration of the traumatic event plays in gradual recovery from hysteria /conversion disorder, in addition to reduction of the modern day PTSD symptoms, perhaps Lellog's paralysis may have diminished with a few sessions of cognitive behavioral therapy. It seems clear that both disorders have in common at least one main factor: that a high level of intense, negative arousal (e.g., fear, anger) somehow seems to impair functioning of the conscious mind, while simultaneously enhancing an involuntary appearance of the unconscious mind, which then displays its effects in various ways on the body and the mind.

6.2.1 How Body Memory Functions Post-Trauma During “Affect Without Recollection”

In the phenomenon termed by Ehlers and Clark(2000), “affect without recollection”(see Schacter, Norman, & Koutstaal, 1997), PTSD sufferers occasionally re-experience physiological sensations or emotions that are associated with their experience of the original traumatic event, but without the trauma victim being able to remember /recollect that the trauma ever took place. Ehlers and Clark's (2000) cognitive model of PTSD, outlined earlier in detail in this paper, attempt to explain the occurrence of this emotion without recall (see Chapter 4: 4.1).

As for my proposal for the explanation of this phenomenon, I liken affect without recollection to a form of *tertiary dissociation* (see Chapter 3) as described by van der Kolk (1996, p.308). These authors define this form of dissociation as the ability of part of an individual's personality (or *ego state*) to contain within it feelings such as pain, fear, or anger related to a traumatic event, while *another* completely different area of the person's personality can remain totally unaware of the trauma and its accompanying emotions. Despite this stringent compartmentalization, the person is nonetheless still able to function in life carrying out their normal, daily routines.

Therefore, I suggest that affect without recollection, much like a flashback, is a form of spontaneous dissociation that also occurs post-trauma. However, it occurs without the vivid “*multi*”-visual and sensory images, and impressions that characterize the flashback. Additionally, I propose that affect without recollection appears to also represent a type of *pseudo-somatoform* experience where the *feelings* or the *physiological stimuli* are being used to *reenact* what the trauma victim “felt” or “sensed in the body” previously during the original trauma (as opposed to what the victim “believed”, as in the somatoform case of Lelog). What occurs is that the body memory, which already made a replica of the original traumatic event (including the accompanying 'feeling and physiological' content now represented in the affect without recollection) is in a continuous state of vigilance to recognize a sufficiently similar external or internal trauma-related cue /threat. When recognition occurs, it takes place through the body memory's use of perceptual priming and associative learning, which, in turn, generate a high level of intense negative arousal upon recognition of the cue. The result is a triggering of either the *affect* or of the *particular physiological stimuli*, at the same time that the high levels of emotional arousal inhibit the hippocampus, so that the trauma victim is instantly unable to access any explicit memory at that particular moment that would give either past information about the trauma, or post-trauma

information. Instead, the body memory's replica of the (previously recorded) 'affect /feeling and physiological sensations' are programmed to play out, and they do so without interruption.

Studies with traumatized children of sexual abuse appear to some extent to support my hypothesis of the existence of a body memory and its influence on affect without recollection. In particular, one study (Burgess, Hartman, & Baker, 1995) investigated the physical and sexual abuse of 34 cases of children under the age of 2 ½, from three different day care centers. At that time, all of the children exhibited somatic memory traces which were defined to be either evidence of physiological arousal, or evidence of physical symptoms closely linked to known factors that took place in the trauma. Follow-up interviews of the same children done 5 years later, when the children were between ages 5 – 5 ½, revealed that the somatic memory traces still remaining in the children involved for example: (1) persistent complaints of anal pain in some of the children who had had foreign objects inserted in their rectums; (2) some of the children clenched their legs together, then defecated and urinated on the floor; (3) several children had developed bowel problems; and (4) children who were known to have been forced into participating in fellatio, had developed eating problems. Despite these symptoms, *none* of the 34 children had drawn a connection between their physical complaints /grievances and their past experience of sexual abuse. Other authors have described similar cases (Gaensbauer, Chatoor, & Drell, 1995; James, 1989).

It is important to note that in the day care center study, the presence of the physical disabilities of children, can tempted one, at first glance, to believe that their cases are cases of the somatoform disorder, conversion disorder. However, it is important to keep in mind that in conversion disorder, patients do not “fail” to remember (i.e., retrieval inability) that they have suffered a past trauma. In addition, although the children's main presenting symptom or complaint was not an *affect /emotion* (one of the two main factors that characterize affect without recollection), the children exhibited persistent, irritable physiological symptoms. I, therefore, suggest that the post-traumatic state of the children's mind and body is clear: (1) inhibition of the ability of (the children's) explicit memory to be able to intentionally retrieve past autobiographical information about the sexual abuse: and (2) spontaneous, unintentional, and *unconscious* reenactment of some of the children's previous physiological sensations experienced during the original trauma. Again the condition seems to reflect a pseudo-somatoform experience much like what I propose affect without recollection represents.

To illustrate the plausible applicability of my theory of how body memory functions during affect without recollection, I present the following two clinical case examples of the phenomenon, as they appear by the authors who reported them. Each of the two case examples is also followed by a short analysis which I present:

“Case Example 4: A rape victim noticed that she was feeling extremely anxious while talking to a female friend in a restaurant, and only subsequently realized that the feeling was probably triggered by the presence of a man nearby who bore some resemblance to the rapist.” (Ehlers, Hackmann & Michael, 2004).

Analysis: Through perceptual priming and associative learning, the body memory was able to compare its stored *replica* of the original trauma, including its accompanying affect (i.e., extreme anxiousness) with the trauma-related cue (i.e., the man standing nearby). Recognition of the resemblance between the replica and the cue then generated a high level of arousal within the patient. This level of arousal in the form of the patient's anxiousness, inhibited the hippocampus (which works in conjunction with explicit memory) from allowing the woman access to previous trauma information regarding her previous trauma. The realization that the man nearby might actually be the trigger for her anxiousness, was inhibited from being able to surface to the patient's conscious awareness, until after the recorded replica of 'the feeling of anxiousness' was programmed to play out without interruption. Only after the body memory's recorded replica was able to come to its preprogrammed stop, was the patient's conscious mind (i.e., explicit memory for autobiographical events) released so that the patient could then intentionally retrieve previous information about the rape.

“Case Example 10: A patient with PTSD who had experienced a severe car accident reported that he became extremely anxious and felt something terrible was going to happen during a train journey. At the time, he was not able to put his finger on what triggered the anxiety. Only afterwards, he realized that he had heard a baby cry shortly before he became anxious. The pitch of the baby's voice was the same as the sound of the impact during his accident. At the time he became anxious on the train, he was not aware of this link and did not recall the accident.”

Analysis: As in the latter case example, utilizing its perceptual priming and associative learning abilities, the body memory compared its stored replica of the original car accident and its

accompanying affect (i.e., extreme anxiousness) with the trauma-related cue on the train, which was the pitch of the baby's voice. The body memory's recognition of the sufficient similarity between the 'replica's sounds' and the 'baby's sounds' then triggered an activation within the patient of a reenactment of his affect /of extreme anxiety (previously felt during the original trauma). This level of negative anxious arousal disrupted functioning of the hippocampus. The result was a blockage of the the patient's access to his explicit memory of stored information he already had regarding the car accident. However, nothing about the past trauma could be intentionally recalled, not even information regarding possible cues that could act as triggers for his anxiety, such as the pitch of a sound even remotely similar to that heard of the car crash). The patient's conscious awareness (explicit) memory was not released from its inhibition so that it could come to the realization of the cue (baby's voice) until after the replica of reenactments of the “old”, original trauma were preprogrammed to play out without interruption.

CHAPTER 7: SUMMARY AND CONCLUSION

In this paper I have attempted to present an explanation of some of the clinically observed core features of PTSD, with a special focus on the re-experiencing symptoms of *flashbacks*, *hotspots*, and *affect without recollection*. Authors such as, Ehlers and Clark (2000), Brewin, Dagleish, and Joseph (1996), van der Kolk (1996), and Armony and LeDoux, (1997), all of whom I have heavily drawn upon to propose my own theory in this paper, have gone far beyond me in laying the foundation for much of what we believe today about the mechanisms driving the disorder of PTSD. Still many other questions related to PTSD and memory remain unexplained, for example, what mechanisms and processes are responsible for why the verbal re-telling of what exactly happened during the trauma, helps to reduce intrusive memories in patients with PTSD. Also, the question of how does the subconscious mind work in general, with respect to memory? For example, the memory phenomenon known as, “*savant syndrome*”, studied heavily by Darold Treffert M.D. It is a rare condition that affects approximately 50% of people diagnosed with “autistic disorder”. Despite these patients' mental and social disabilities, savant patients possess extraordinary skills in areas such as, mathematical calculation, mechanical design, drawing, and music. In addition, these 'savant' talents are accompanied by a phenomenal, and quick memory for the meticulous details of what is to be remembered. Furthermore, their skills are performed with such ease, that the memory behind their acquisition, is believed to be *subconscious* researchers of the syndrome have yet to explain how and why it occurs.

It is hoped that in this paper, my body memory theory of the intrusive memories of PTSD, may stimulate more interest in investigating implicit memory (involved in acquisition of skills). The suggestion that two separate memory systems exists within implicit memory, one of which is a subconscious memory, may hold the key to answering some of the questions still remaining as to the etiology of PTSD.

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